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PROFILES

October 1985

The Magazine for Kaypro Users

Programming:
Forging your own tools

Adding a hard disk



[REDACTED]



2400 bps modems: Do you Really need another speed?

- Is the shift from 300 to 1200 bps going to repeat itself at 2400 bps? The answer is both yes and no. There certainly are applications for 2400 bps asynch dial-up modems, but we shouldn't expect 1200 bps to die overnight.
- 2400 bps modems can improve throughput, thereby getting tasks done quicker and more economically. However, 1200 bps has become the virtual standard for professional dial-up communications, and most users are satisfied with it. So why consider a 2400 bps modem at all?
- One reason is flexibility. If the modem you select operates at all three speeds (300, 1200 & 2400) in accordance with accepted industry standards, it will serve virtually all dial-up applications now and in the foreseeable future.
- The modem you select should be the MultiModem224. It is Bell 212A and 103 compatible at 1200 and 300 bps, and CCITT V.22bis compatible at 2400. It is also 100% compatible with the Hayes command set, meaning that it will work with virtually all communications software packages, at all three speeds. Other features include both synchronous and asynchronous operation, full intelligence and a phone number memory.
- The MultiModem224 is available in both desktop and IBM PC™ internal card versions. (There is also a rack-mounted version for central sites.) And as a bonus, we provide free offers from ten of the most popular on-line information services, including CompuServe™, Dow Jones™ and The Source™.
- A 2400/1200/300 bps modem is just a plain good investment. Why not let the MultiModem224 provide your communications for both today and tomorrow?

MultiTech Systems 

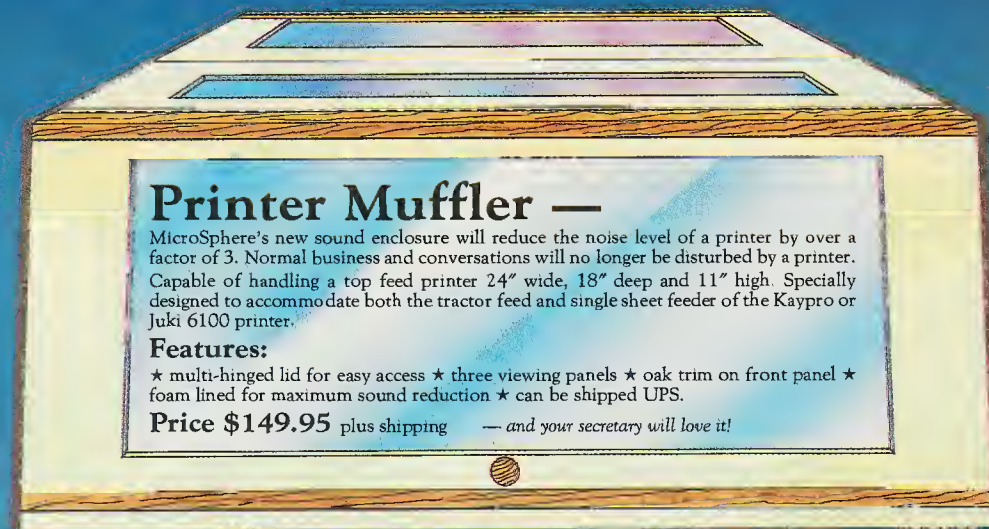
The right answer every time.

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IS YOUR PRINTER'S RHAPSODY MAKING YOU BLUE?

NEW PRODUCT



KAYPRO 16

256 to 512 Memory Upgrade Kit	\$69.95
512 to 640 Memory Upgrade Kit	\$CALL
Improved Character ROM: Clear, easy to read new Character Set	\$29.95
TLC Lisp — with turtle graphics	\$250.00

Kaypro 1, 2X, 2-84, 4-84, 10

IBM-PC type external monitor adapter, simultaneous dual screen operation, just as sharp and clear as internal screen

Electronic RAM Disk and Printer Buffer Combination—the ultimate add-on for Kaypro I, II, 4-84, 2-84 and 2X Computers.

Incredible speed and efficiency are offered using MicroSphere's dual operation Electronic RAM disk and printer buffer. No longer will you need to wait for your Kaypro to slowly finish mundane tasks such as running a printer or waiting for floppy drives to turn when you have better things to do.

Features:

- Can be powered externally ★ 255 directory entries ★ 10 MHz microprocessor speed
- Compatible with Pro 8 and Plu-Perfect or 5 MHz speed up kits ★ Choice of Drive A or B
- RAM disk memory not lost on cold boot or reset of Kaypro ★ Printer buffer sizes: 4K, 32K, 64K
- Fully buffered data transfer using Z80 PIO
- Micro-Cornucopia Pro 8 Version 3 ROM includes RAM Disk code
- Printer buffer runs independently of RAM disk operation
- Installation Kit for Kaypro 1, 2-84 and 2X without clock or modem \$10.00
- Note: Kaypro 4-84 & 2X with internal clock and modem will disable either the clock or modem when RAM Disk is installed.

Any RAM Disk listed below can be expanded to 1mb by adding memory chips.

Tested RAM Disk without RAM Chips	Reduced RAM Disk Prices!
56 RAM Disk	\$295.00
128 RAM Disk	\$270.00
256 RAM Disk	\$445.00
512 RAM Disk	\$520.00
1MB RAM Disk	\$595.00

When ordering, specify computer model and printer buffer size.

	4MHz Floppy	Kaypro RAM
Recalc 14 K Perfect Calc	9:31.25	1:17.78
Load LADDER.COM	9.38*	2.12*
Load Printer Buffer		
OK file, 11 pages, 2586 words		24.61*
Using PIP to the LST device		
Time in seconds		

RAM Disk External Power Supply \$30.00

Monitors

Description	Model	Price
Zenith Composite 12" Amber	122	\$119
Zenith Composite 12" Green	123	\$114
Quadram 12" Amber Chrome		
IBM/PC Type		\$195

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Dealer inquiries invited.

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Easy and exciting language for all ages. TLC LOGO is an exceptionally complete logo with vectors, multiple turtles, full floating point decimals and extremely fast program execution.

TWO VERSIONS OFFERED:

STANDARD version using only internal graphics of Kaypro 1, 2-84, 4-84, 2X and 10; no hardware additions or modifications required; 16,000 pixel resolution. \$99.95

DELUXE version for all Kaypro Computers that have the MicroSphere Color Graphics board. Features 16 colors, 32 sprites, 49,000 pixel resolution and utilities such as screen dump to printer or disk. \$129.95

Special: Color Board & Deluxe TLC Logo \$199.95

Infocom ADVENTURE Games/ Kaypro or PC Format

2 Zork 1	\$34.95	2 Enchanter	44.95
3 Zork 2	39.95	3 Infidel	39.95
3 Zork 3	39.95	3 Sorcerer	39.95
4 Deadline	44.95	1 Seastalker	34.95
4 Starcross	44.95	2 Cutthroats	34.95
4 Suspended	44.95	3 Hitchhikers	34.95
2 Witness	44.95	3 Suspect	39.95
2 Planetfall	44.95		

LEVELS: 1=Jr., 2=Standard, 3=Advanced, 4=Expert
INVISICLUES available at \$7.95 each for all above games.

VIDEO GENERATOR FOR KAYPRO

Note: Dual Screen means internal Kaypro screen and external monitor work at the same time.

- Kaypro I, 2-84, 2X, 4-84, 10 standard composite video \$89.95
- New Kaypro 1, 2-84, 4-84, 2X, 10 IBM type external monitor, dual screen operation \$49.95
- Older Kaypro 2 & 4, standard composite video, dual screen operation \$49.95

A NEW DIMENSION FOR KAYPRO COMPUTERS Color Graphics Board. Features 16 colors, 32 sprites, 256x192 bit mapped graphics. Software includes 3 editors, drivers and routines to access graphics system. Utilities include screen dump to disk and printer. Dual screen operation.

Color Board for Kaypro I, II, 4, 2-84, 2X, 4-84, 10 and Robie \$145.00

INSTANT GRAPHER 2.0 (For use with Color Graphics Board) Creates bar charts, stacked bar charts, hi/low, line graphs from keyboard, Perfect Calc, CalcStar or text files. \$40.00

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P.O. Box 1221
Bend, Oregon 97709
503-388-1194



Professional software for your Kaypro at low, low prices.

Proportional Spacing. Now in Version 3.0. Only \$22.95

A program that automatically installs your WordStar to print in proportional spacing and right justified margin. This means such letters as "i" and "l" will occupy much less space than letters like "m" and "w," and the space between words will be evenly spread out. As a result, every document you print, every letter you send out from your office will be dramatically improved in printout appearance and look almost *typeset*! Moreover, you can continue to print in right justification, boldface, shadow print, underscore, superscript, subscript, and a combination of these features while in proportional spacing mode. Best results are achieved when you use a PS printwheel, but fine even if you use the ordinary non-PS 10, 12, or 15-pitch printwheels. No crowded characters, even on one-word short lines. Comes with a disk and a manual plus a variety of printing tricks. Requires Kaypro, Juki, Brother, Silver-Reed, Star PowerType or any other letter-quality printers. Simply the best of its kind on the market at any price!

Extra Bonus for Juki 6100 printer: Our Proportional Spacing program will also automatically install your Juki 6100 to print French cedilla (ç) and German umlaut (ü), two foreign characters not on your keyboard. Now your

Juki 6100 can print all the diacritical marks needed for French and German. Detailed instructions on how to print the other four special characters (¢ § — £) on Juki printwheels are included in our manual.

Now, Version 3.0 with more features added:

1. Allows you to install up to four different kinds of printwheels, including the new Juki Standard PS and the 15-pitch Mini Majestic (sold below).
2. Can print your NEW WORD files in proportional spacing and right justified margin.
3. Detailed instructions on how to customize our program, if necessary, to produce a printout that suits your own personal taste.
4. Professionally printed and bound manual.
5. More printing tricks explained in plain English (not computerese) by our in-house printer specialist for you to take full advantages of your letter-quality printers.

Note: The Keypro Letter-quality printer that comes with your Kaypro 2X is the same as the Juki 6100 in every aspect except color.

For Kaypro II, 2, 2X, 4, 10, 16, 286i, and all IBM compatibles.

Mailing List. Only \$15.95

Just load it and start data entry! Extremely easy to use. Then print 1, 2, 3, or 4-across standard Avery labels. Specially set up for your DataStar and MailMerge, so you will get all the sophisticated features of DataStar and MailMerge: Add, delete, sort, and update your list anytime. Can sort *any* field. Number of records limited only by your disk capacity. Many tricks and tips included in our clearly written manual. Originally developed for a magazine subscription agency to keep track of more than 100,000 subscribers. Why waste time creating your own when you can use our fully tested and debugged program? *Requires at least DataStar and MailMerge to run.* **For all Kaypro models and IBM compatibles.**

Bibliography. Only \$15.95

An electronic marvel for modern scholars and writers! Just call it up and start building your own electronic bibliography database. Then print in MLA, Chicago, Trabian, or any other styles. Specially set up for your DataStar and MailMerge, so you can add, delete, sort, and update your bibliographic items anytime. Can sort *any* field. Number of records limited only by your disk capacity. Many tricks and tips discussed in our Manual. Used by the author in his Ph.D. dissertation on medieval Chinese military institutions. Saves you hours of frustration in creating your own. *Requires at least DataStar and MailMerge to run.*

For all Kaypro models and IBM compatibles.

Genuine Juki 6100 printwheels (100 characters). Only \$22.95 each.

Roman PS	The Quick Brown Fox Jumps Right Over The Lazy Dog. [\]^_`{ }~
Standard PS	The Quick Brown Fox Jumps Right Over The Lazy Dog. [Ω]Δ°½¼¹²
Caroll OCR 12	The Quick Brown Fox Jumps Right Over The Lazy Dog. [Ω]Δ°½¼¹²
Mini Standard 12/15	The Quick Brown Fox Jumps Right Over The Lazy Dog. [Ω]Δ°½¼¹²
Mini Majestic 12/15	The Quick Brown Fox Jumps Right Over The Lazy Dog. [Ω]Δ°½¼¹²
Joan Italic 10/12	The Quick Brown Fox Jumps Right Over The Lazy Dog. [Ω]Δ°½¼¹²

Note: Only Courier 10, Prestige Elite 12, and Roman PS are in the Juki Sequence and only these three can produce diacritical marks for French and German. The rest are in the Special Sequence and capable of printing other substitute characters as shown above. We now carry a full line of 18 genuine Juki-brand printwheels. You can order any Juki printwheel not listed here. Printwheel catalog will be sent free with any order.

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Our software engineer has fully tested and assembled a disk full (191K) of the finest CP/M programs now in the public domain. Saves you time and money to collect these on your own. Includes KSTROKES (a SmartKey-like program), SCREEN DUMP, NEW SWEEP, KMODEM, UNERASE, and much more. Absolutely a must. **For Kaypro CP/M models only.**

Juki 6300 printer. List price \$995.00. Our price Only \$749.00

Our in-house printer specialist fell in love with this latest baby from Juki. Highly recommended to those looking for a high-speed letter-quality printer. Prints at 40 characters per second, in 10, 12, 15 pitch and proportional spacing! Uses 96-character Diablo printwheels and ribbon. 16-inch wide platen. Fully compatible with all Kaypro models, including Kaypro 16 and 286i, and our Proportional Spacing program. One-year manufacturer's warranty. FREE UPS shipping. No sales tax when shipped out of New Jersey.

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<input type="checkbox"/> Juki 6300 printer	_____

Subtotal

NJ residents only, add 6% sales tax

First Class Postage \$2.00

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TOTAL

☐ Check Enclosed ☐ VISA ☐ MasterCard

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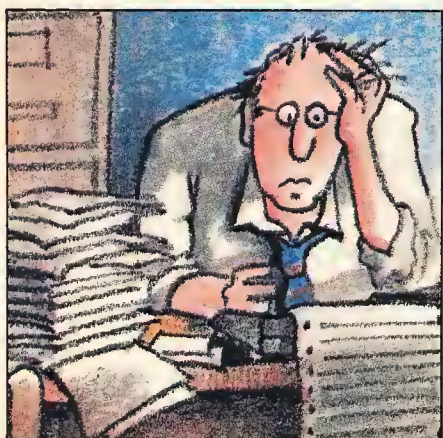
Kaypro Model _____ Printer _____

PROFILES

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October 1985
The Magazine for Kaypro Users



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DU, Part 254

Cover illustration by
Manuel Garcia

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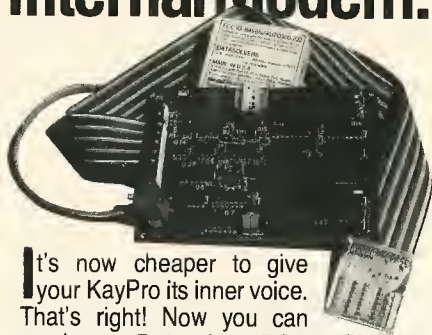
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Your Kaypro Just Isn't the Same Without a Datasolvers Internal Modem.



It's now cheaper to give your KayPro its inner voice. That's right! Now you can purchase a Datasolvers DS1200SMT internal modem at the newly reduced price of **ONLY \$349.95!!**

The DS1200SMT is a 1200-300 baud, Hayes compatible smartmodem designed specifically for internal installation in your KayPro computer (it works on all KayPro models except the new 16)! The modem comes complete with all installation instructions, free time on NewsNet (the new business information network), all needed cabling, user's manual, a 180 day warranty, and even software on diskette! Plus, all Datasolvers modems are installable options with MITE software.

NEW LOWER PRICE!!!

When installing the DS1200SMT you won't have to worry about soldering, drilling or modifying your computer. It's an easy process which takes about 15 minutes. And yes, you can do it!

Let's face it — 300 baud is alright, but 1200 baud is where it's really at! And now you can be in the forefront of communications for less. Give your KayPro the inner voice it deserves . . . a 1200 baud "voice," the DS1200SMT for only \$349.95.

If you have any questions give us a call, or contact your local KayPro dealer.

CALL US NOW: (316) 264-5068



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About PROFILES

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Letters

Please send letters to PROFILES, 533 Stevens Avenue, Solana Beach, CA 92075.

Micros and the Third World

As the recipient of five computers donated by Kaypro, the University for Peace is most appreciative.

We are avidly interested in contacting Kaypro Users' Groups for sorely needed help and a tie-in for resolving the occasional problem.

The thought occurs to me that since the University for Peace has just concluded a major convention here with more than 500 participants on "Information and Education," and we are also coordinating a small nucleus of Latin American organizations interested in creating data banks in Spanish, the idea discussed in your article ("Editor's Notes," June 1985)—the sharing of information between established users' groups and Third World computer users—could be converted into a major project on an international level.

It makes sense. It undoubtedly could obtain the financial support of several international agencies such as the Interamerican Development Bank, A.I.D., World Bank, etc. Anyone who is at all familiar with the computer situation in the Third World, where we are dedicating our major thrust, recognizes the need for all kinds of support.

Murray Silberman
University for Peace
Costa Rica

We are sending you the list of KUGs worldwide. Also, since you are on the BBS list mentioned below, you may be hearing from others. Finally, you may wish to look into the following offers:

Count us in!

I found the article "Microcom-

puters and the Third World" to be very interesting. Maybe we can help. Gene Ryan and Associates is a consulting firm specializing in technical assistance in the energy field, and in particular in the geothermal field. Some of the applications in which we are involved are district heating, binary power generation, heat pumps, greenhouses, and aquaculture. Of course, all of these require extensive application of fluid flow, thermodynamics and the like. We use a Kaypro 10 for our calculations and have an extensive library of proprietary programs.

We would be willing to offer a reasonable amount of technical assistance to a Third World person or organization without compensation. This could include development of software to meet their specific needs. Of course, this would have to be on an "as time permits" basis.

Gene Ryan
Klamath Falls, Oregon

Congratulations and count us in! We'd like to help, so here's our idea.

PeopleTalk would like to make our new-user oriented book products—including *The Perfect Manuals for Kaypro II and 4*, *Wordstar and Friends for Kaypro II & 4*, and our new *All Star Guide*—available for complimentary machines shipped to foreign users by Kaypro at no charge.

In addition, we extend an offer to sell to any foreign Kaypro user any of the PeopleTalk bookware, software, and hardware products at a 20 percent discount off our normal U.S. retail price, plus shipping and handling. This should help to offset the additional shipping costs involved in sending products outside the U.S. and (hopefully) alleviate the problem with currency exchange rates.

Keep up the good work. We look forward to working with you.

T. Gregory Platt
President
PeopleTalk Associates, Inc.

I am Telecomms coordinator of British Osborne Users Group (700+ members) and we have the means to help with many computer problems and can read and write to most makes of micros directly. There are other Osborne group members in the Third World in useful places to help at close range if needed.

I have made contact with UNCTAD/GATT International Trade Center Geneva—the U.N. agency to help the Third World with any trade related request. They have a huge database of trade statistics, market reports, and lists of potential business contacts. I and other Brits with micros and market research expertise can help others access this info if asked.

Peter Wingfield-Stratford
NetReach Group
28 Lansdowne Road, Holland Park
London W11 3LL
United Kingdom

Reaction to our June 1985 "Micros in the Third World" was most encouraging. Due to overwhelming demand, our address list of users worldwide who may need help, called WORLDUSR.LST, is now available on a trial basis from two bulletin boards: the ONKUG RBBS—(619) 259-4437, 300 or 1200 baud, 24 hours a day; and the Kaypro SIG on CompuServe (PCS-25). We look forward to your reports of any especially rewarding exchanges.

PowerSoft talks back

Contrary to Michael Scheff's no-

tions ("Writing Screenplays with a Kaypro," July/August 1985), the keys used by FeatureFormat Professional to make screenwriting automatic and painless are assignable to any key or combination of keys the writer wants.

If he was familiar with the program, he'd also know that FeatureFormat Professional does everything for screenwriters that the key definition programs he recommends do—plus about 80 percent more.

Also, the correct price of our product is \$79.95 (not \$99.99), and our correct address and phone number are 1049 N. Magnolia Ave., Los Angeles, CA 90006; (213) 394-6777.

Kip Gordy
PowerSoft

Michael Scheff replies

After testing an improved version of FeatureFormat I've revised my opinion.

As I said in my article, the main benefit of FeatureFormat is that it's *easy*. You can install the program and be writing screenplays in minutes.

Changes in key assignments, line length, etc., can be made through simple menu selections, and key locations can easily be changed to suit your preferences.

Conclusion: If you don't already own Smartkey, Pro-Key, or any other key defining software, and don't mind paying \$79.95 for a program to help you write screenplays, then FeatureFormat is for you.

On the other hand, if you already invested in a key definer, or want to try one of the public domain key definers, then you may want to follow the steps outlined in my article. The result will be a method of defining keys that's almost as flexible as FeatureFormat's and it's free. □

KAYPRO SOFTWARE

MBACOUNT/\$89.00: Small business double entry accounting. Up to 40 asset, 40 liabilities, 40 income, 80 expense & 20 capital accounts user assignable. Prints checks, P & L, balance sheet, chart of accounts, single account details, check ledger, etc. Generates a printable detail journal for audit trail.

A/R, A/P, PAYROLL INVENTORY: These programs are available as either stand alone software or MBACOUNT integrated modules. Stand alone **\$79.00 ea.** Integrated **\$50.00 ea.**

PROFBILL/\$149.00: Time keeping and billing for all professional people who bill at various hourly rates. Handles 400 clients, 10 partners/employees. Prints billings, statements, aged billings, partner/employee hours, etc. May be used stand alone or integrated with MBACOUNT.

SBACOUNT/\$79.00: Small business single entry system. Up to 99 income and 99 expense categories, user assignable. Prints checks, P & L (month, quarter, YTD), single account details, check ledger. Generates a printable income/expense journal for audit trail.

MAILLIST/\$89.00: Mailing list/filing program. 10 fields per record and up to 900 records per file, files limited only by disk space. Sort/print all or partial list by most fields on 1, 2, or 3 across labels on 80 col. printer. Search, add to, delete or edit by most fields.

MBADATA/\$89.00: A data/base-filing system usable without learning any special language or control codes. Up to 253 characters, 24 fields, 900 records per file. Sort, print, display any fields in any location in any order desired. Menu driven with step by step prompts!

STANFORM/\$79.00: Need to fill out pre-printed forms? Then this program was made for you! Generates programs for printing data in the proper location on any pre-printed form that will fit into your printer. Each form need be generated only once as it is saved on disk.

\$FINANCE/\$79.00: Personal finance, prints checks, posts to as many as 120 user assignable expense categories, posts checks & deposits, reconciles multiple checking accounts, etc. Similar program for up to 9 charge cards. Extracts/prints listings for various categories.

TOUCHTYP/\$49.00: Parallels high school/college level touchtyping course. Displays typos, final score. Timed speed drill mode. Electronic typewriter mode converts your printer to a one line memory electronic typewriter with settable margins, tabs, line spacing, etc.

MSBCHART/\$49.00: Prints alphabetized list of all variables & line numbers referenced in any program written in basic cross referenced to the line number where used. A godsend when writing or modifying basic programs.

Place your order or request **FREE** catalog by mail or if using COD or credit card, telephone anytime of the night or day. Add \$3.00 shipping & \$3.00 additional for COD. Shipment will be no later than next working day by 1st class mail. Californians must add 6% tax to prices.

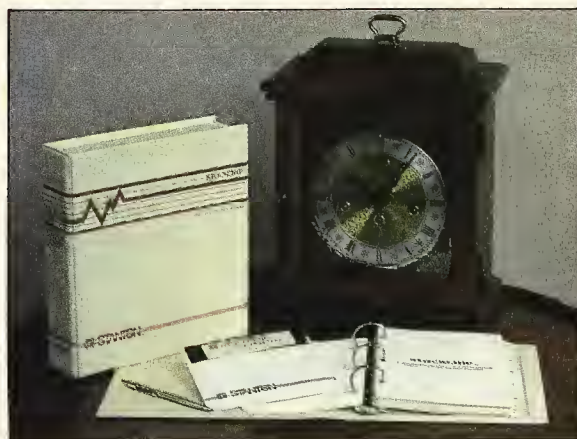
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Q & A

by Tom Enright

We welcome and read all your letters. Letters of general interest are printed in the Letters column. Pleas for technical help are dealt with here, if they lend themselves to short answers, or in Technical Forum if the question is more involved.

Due to the volume of letters, we simply can't respond to all the requests for assistance. Problems requiring an immediate reply should be taken to your dealer. Kaypro Technical Support can be contacted at (619) 481-3920. Or write to Kaypro Software Technical Support, P.O. Box N, Del Mar, CA 92014. Please include a daytime phone number in all correspondence.

Autorun program

In the June 1985 "Technical Forum" you referred to a program called COMLINE to insert a command line on the boot track of a CP/M diskette.

Sounds great, but where do I get a copy of this program? The only other way I know of to do this is by using the COPY program.

Please, when you list something as useful as COMLINE, tell us where to get it.

R. S. Ochsner
Sandia Park, New Mexico

The comment on COMMAND.COM was inserted in the column late, just before going to press. In the hurry we forgot to mention that it is a public domain program.

Finding specific public domain programs can take some persistence. If your local users' group doesn't have a copy, you'll have to start looking on BBSSs. Try the ones closest to you first, then try boards farther away. If you can't find it locally, ONKUG RBBS does

have the program. Call (619) 259-4437 (300/1200 baud).

Disappearing underline

I have a Kaypro 4'83 with WordStar 3.3. I use WordStar for virtually all my word processing, but two problems are driving me absolutely insane. Both of them involve the underline symbol.

In order to underline between words, I have to type an underline character between words to be underlined. I can live with that. But WordStar then treats the entire phrase as one word when calculating line endings. This makes editing and formatting cumbersome. Also, if I move the cursor over an underline character, it is erased.

My last question concerns page headers. Is there any way that WordStar will allow two-line headers? Most of the papers that I do require the page headers to be done in two lines.

Sandy Landsman
Flushing, New York

You may be able to solve the underlining problem with a little judicious patching. Many printers have two underlining modes, word and continuous. You could patch Alternate Pitch (label PALT at 06BB in WS 3.3) to start continuous underline. Then patch Standard Pitch (label PSTD 06C0 in WS 3.3) to end continuous underline.

This would allow you to begin underlining with ^PA and end it with ^PN. No more typing the underline character between words. This assumes that your printer has two underlining modes available.

As for deleting the underline characters, I have never heard of that happening. If you got your

copy of WordStar after you bought the computer, it may have been intended for a Kaypro with the new universal ROM. Kaypro did some patching in WordStar for universal ROM machines that makes it incompatible with older Kaypros. Other than that, I don't know what is happening.

WordStar will not do multiple header lines, but NewWord (a WordStar work-alike) will. The patch locations for alternate and standard pitch in NewWord should be in the manual that comes with the program. If multiple headers are important to your work, you should consider buying NewWord.

Perfect Filer patch

I am one of the people who received Perfect Filer with my Kaypro 4. I have used the program to create a database of my customers and have grown fond of Filer.

The only concern I had about it was that it would not allow me to enter a current date beyond 1988. Since 1988 isn't too far in the future, this problem has caused me some real concern.

After no small amount of work I've managed to find the patch location that controls the current date in Perfect Filer 1.2.

To perform the patch, put your CP/M disk in drive A and a copy of your Perfect Filer disk in drive B, then type DDT B:SETUP. When the program has loaded and the " - " prompt is on the screen, type S0715. DDT will display the value in that location to be 58. Type 63 and press RETURN. Next type a period and press RETURN again. Now enter a ^C and you will return to the operating system. Immediately type SAVE 16 B:SETUP.

Now Perfect Filer will be useful the rest of this century.

David Porritt
Plano, Texas

There's really no question here, but I figured that Perfect Filer users would find the information useful. Remember to do your patching on a copy of your working disk. Test the patch thoroughly before trusting it with your data.

Confusion down under

I'm writing to tell you of my satisfaction with my new Kaypro 4'84 and with your agents in New Zealand. I had used a word processor before purchasing my Kaypro and I am impressed with the performance improvement the Kaypro has given me. The amount of documentation that comes with the machine is impressive, but I still have a couple of questions.

1.) On the CP/M disk are a number of files that aren't covered in the manuals. Some of them are specific to the Kaypro because the name KAYPRO, or some abbreviation, appears in the filename.

2.) There is a program that displays the real-time clock. The listing for the clock program refers to a file called CLOCK.DOC, which isn't on any of my disks. The manuals make no reference to the clock, a feature that I had hoped to make use of.

3.) The *Kaypro Users' Guide* makes reference to a file called KAYPRO.LRN, which isn't on any disk that I received.

Can you help to enlighten me on any of these points?

L. Stockley
Papakura, New Zealand

Unfortunately, manuals can't be changed as fast as the hardware. New manuals can't be written

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Q & A

until the writers know exactly what changes are being made in the hardware or the software. Most companies don't want to wait that long before shipping new versions; so they ship the new machines with the older manuals. Your dealer may be able to get updated manuals from Kaypro Dealer Support.

The KAYPRO.LRN file was originally meant to be part of a tutorial included with Perfect Writer. It was eliminated from the software package when Perfect Writer was dropped. Kaypro's Documentation Department just forgot to eliminate it from the manuals.

The real-time clock is more of a problem. CP/M 2.2 doesn't have provisions for time and date stamping of files, or for accessing a real-time clock. Kaypro has never written any software for accessing the clock other than the CLOCK.BAS file you already have. That leaves you the task of writing the software yourself, or finding some from the public domain.

One other possibility would be to get a replacement ROM from Micro Cornucopia. Their ROM does allow you to pull the current time into text files with a simple keystroke. It also supports much easier access to the clock by other software.

Other than KTERM, which is a very dumb terminal program, I can't tell you much about the other files with Kaypro in their name. There have been too many variations to be sure of which ones you have. KTERM is a low-level communications program. Everything that you type is sent out the serial data port—presumably to a modem. □

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Editor's Notes

In defense of programming

by Tom Foote

Ho Hum," and "Don't!" were among reactions to this issue's theme. If you have the "ho hums" about programming, consider this:

Programming gives power

Programming means power to forge your own tools for tackling tedium; power to explore, understand, and master much of your computing environs.

Got a 50-page address file that you must convert from all caps to caps and smalls for "personalized" mail merging? Don't want to spend five hours doing it a word at a time using WordStar? Then write a program that does the work in seconds, and serves happily ever after.

Need to send esoteric set up codes to your printer? Need to crunch a 30-year amortization table? Though commercial and public domain offerings may help, do-it-yourself-software is often the best way out, especially when the task at hand is repetitive.

Programming can be fun

In principal, programming involves writing a list of instructions that the computer understands. In practice, you wage an "error war," an engaging cerebral battle to communicate with a system that insists you speak its language—perfectly every time. You enthusiastically attack. It cryptically announces your failure(s). But you repeat the cycle making progress at every step. Sooner or later you win.

Your prize? The bliss of seeing hours of manual tedium trounced in seconds; the ability to use, share,

and improve your program to tackle future tedium; and enriched skills for writing future programs. Of course, the more wars you fight, the better you get at winning quickly.

But watch out. Future challenges become so enticing, the potential rewards so great, your feeling of invincibility so overpowering that you may begin acting a little crazy. You do things like deliberately deciding to take four hours to program what would, if done manually, consume two. You begin arguing things like "machines should work, people should think—even if it takes longer." You

might even tumble into that all-consuming black hole called "recreational programming," never to be seen again.

If you've ever chosen to drive the challenging scenic mountain road that takes four hours just to avoid the ugly bumper-to-bumper route that takes two, then you're highly susceptible. Be careful.

Programming gives insight on machine workings

Everything you do on a micro involves programs. These include programs that open, read from, write to, and close files; programs that move, jump, compare, loop, store, recall, send, and so on—much like programs you might write.

In short, writing your own pro-



grams teaches you principles from which all programs work; principles that could unstuck you where the programmaphobic might stay stuck.

Programming can be lucrative

Those doing well at it include Microsoft's Bill Gates (who's mug made the cover of *Time*), Borland International's Philippe Kahn, and a host of young lesser-knowns.

Interested? Then inspect the 1985 *Programmer's Market*

In practice, you wage an "error war" . . .

(Writer's Digest Books, \$16.95). It offers tips on starting, and valuable detail on more than 700 microcomputer software buyers.

Programming changes you

I argue, often with those who think I'm *really* crazy, that programming has, at least, changed *me*. I know it's influenced the way I do things. That is, it's helped me respect the efficiencies of following a task list; of doing like tasks "in batch"; of first breaking up and translating complex concepts into the language my brain best understands, then loading it all into my own memory before I ever try to write or speak about it.

Programming. Give it a try. Then fasten your seatbelt and see what it does to *you*. □

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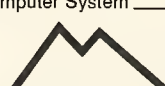
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by Brock Meeks

"You are not alone."

Words from an eerie, online adventure game? No, they are words of advice offered by "basement hacker" Gary Sanderson to the thousands of public domain programmers.

Sanderson is referring to the bulletin board systems all around the country that offer help to the agonized "hacker."

What thanks?

Public domain programming is something of an Information Age cultural phenomenon. The micro-computer made it possible to sit and hack out a program without being tied to an institutional mainframe. Inspired by this computing freedom, a large community of hackers (not to be confused with computer users engaged in criminal activity, despite widespread misuse of the term) grew up around a programming-for-the-masses mentality, creating programs for the rest of us.

These hackers gain little by offering their programming skills to the public. Indeed, most public domain programmers remain anonymous, though most of us use their products every time we boot up a disk.

Most of the thanks these programmers get is in knowing that

Life at 300 Baud

Hackers need help, too

people are using their programs. Feedback from users is rare. (When was the last time you sent a letter to your favorite software developer?) So they use an informal RCP/M and BBS network to stay in touch and keep up with who is working on what. There aren't any computer fairs for public domain programs.

I will examine two important "support systems" below. One system uses a BBS and a magazine, the other functions as the West Coast clearinghouse for public domain software development and distribution.

Computer Language Magazine

Location: San Francisco, CA

Phone: (415) 957-9370 and 957-5840

Hours open: 24/day

Log-on: password issued

Baud rate: 300/1200

CompuServe access: Go CLM-1

Computer Language Magazine (CLM) is a technical journal for those who enjoy a serious treatment of trends and important issues in the world of programming languages and operating systems.

To get its word to the public, CLM uses both print and electronic media. Published as a conventional magazine, CLM also provides its readers electronic access via two BBSs and an electronic forum on CompuServe.

Each of the BBSs holds ten megabytes of information. The largest section of each board is dedicated to programming tools and public domain programs. The boards are "networked" to share file space,

creating one 20-meg BBS. (Given the nature of the board, somehow this doesn't surprise me.)

The message base contains discussions of various programming techniques and some good-natured debate on the viability of esoteric languages such as Forth and S-Basic (remember S-Basic?).

The print magazine, because of space limitations, allows only one page of code per article. The complete codes are published on both BBSs and on CompuServe.

Why does CLM have two BBSs and a forum on CompuServe?

"With the magazine deadline running two months in advance, it's impossible to print up-to-date information," says CLM editor Craig LaGrow. "Using the BBS and CompuServe, we provide an update on what's in the news and receive feedback from readers in a much shorter time frame."

CLM takes full advantage of CompuServe's versatility and mainframe storage capacity. And with CompuServe's worldwide access, this online support system becomes a global resource.

CLM's online database consists of ten areas, ranging from the "Code Swap Shop" to the "Faraday Project" (a joint effort by those involved with CLM to create an all-purpose programming language). A "Reference Room" database includes updated news of the programming world.

CompuServe's real-time computer conferencing capability allows CLM to bring in industry pundits for guest "lectures" (electronic lectures). During lectures

guest "speakers" type in their thoughts in real time. Those online during the lecture can then respond in the same manner.

An online perusal of CLM back issues reveals articles such as "Forth: Twitthe Curthed, Too," which shows how Forth can be given the same recursive powers as LISP and C. "Porting Unix Utilities" discusses the problems encountered when porting Unix from a mainframe to a micro. "Getting to Know PL/1" provides insight to this powerful but little-known language.

If the term "hacker" brings a smile to your face, and you are frustrated by watered-down technical articles in popular computer publications, CLM may be just the publication (electronic or print) to satisfy you.

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"Foul," I cried, nosing around the members' roster of Potpourri. "This system is guilty of electronic name-dropping." I could hardly believe my eyes. This board is virtually a "Who's Who" of the public domain software world: Irv Hoff, Wayne Masters, Paul Trainia, Charley Strom, Dave Hardy, Ron Fowler, Richard Conn (need I say more?). This board is packed with programming expertise.

A quick look at Potpourri's statistics tips you off about the system's power. Online storage capacity is a beefy 20 megabytes. The board will handle any baud rate you can throw at it, short of a 4800 bps leased line. Calling from outside the United States—as a regular contributor from Panama does—with a hot foreign public domain program? No worries here over incompatible Bell and CCITT standards—Potpourri operates on both.

To gain access to this board, which sysop Wayne Masters calls
(continued on page 23)

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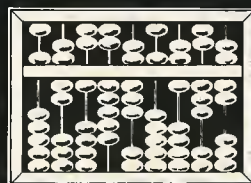
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JUL - AUG 1985 VOL. 3 NO. 4

Official Newsletter of the KAYPRO USERS' GROUP

YOU...ASKED FOR IT!

Things change fast in this field of high technology. With Kaypro making the ultimate move to MS-DOS and introducing the 2000 with a 3¼ micro diskette, it's time for KUG, as well, to move right along.

NOW HOLD ON! KUG will not abandon our all time favorite, CP/M, nor will it forget the many Perfect Software users. In fact, our recent survey shows that KUGGERS use Perfect Writer almost 2 to 1 over WordStar. [See SURVEY inside.]

Starting with this issue, we will have a table of contents and each article listed will be coded so that you will be able to tell if it pertains to WordStar or Perfect or anything else.

Inside you will also find two new columns: 1) STARWARES, an ongoing discussion and tutorial on the use of the MicroPro software that is being bundled with almost all the Kaypro computers; and 2) MS-DOS STUFF, written by the same one who brings you CP/M STUFF every issue. An easy entrance into the world of MS-DOS.

You have also asked us to separate and/or partition KUGRAM so that Perfect and WordStar appear in different sections. Well, we're getting close, but it is difficult to distinguish some of the subtle differences. However, we will try to do it with the articles pertaining to the new [MS-DOS] and the older [CP/M] systems.

The KUG Library continues to grow, and as you requested, we are offering package deals on special program categories. The Statistics Six-Pack seemed to prove you right again. [See LIBRARY SPECIALS.]

Because of the shift to 16 bit machines by the Kaypro Corporation and the fact that we support ALL Kaypro users, we are now in the process of building an MS-DOS library of Public Domain software.

Your suggestion and request that we try to get our local Kaypro dealers to offer discounts to all KUG members is finally coming to fruition. [See MEMBER DISCOUNTS article.] In response to a survey sent to dealers, almost 100% of the more than 100 who have answered as of this writing will be offering discounts to our KUG members upon presentation of their KUG ID Cards.

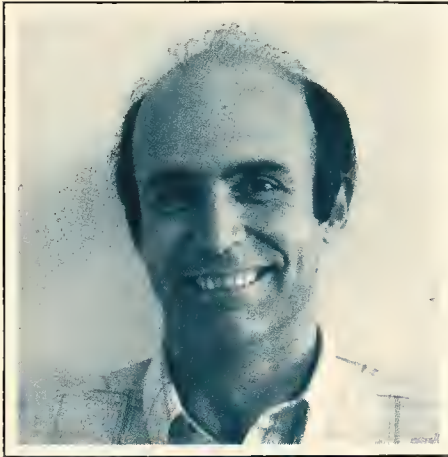
When things are looking up, things are looking up. When we visited with Thorn EMI at Comdex, Atlanta, we were greeted by Mr. Clem Scharwath, who advised us immediately that the Perfect Software protection will be REMOVED! In unity there is strength.

We are also working with Tom Foote, of Profiles, in attempting to get computer information and public domain software out to the third world countries. [More inside.]

The above is a recent front page of the KUGRAM, KUG's 32 page newsletter.

To learn more about KUG and its many other services, use the attached reply card. If the card is missing, send your name, address, phone number and computer model to:

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Flea Market

Public domain disk editors

by Ted Silveira

Both last month and this, I've written about the disk editor DU-V88, in "DU to the Rescue." Disk editors are very useful programs, and DU has become a sort of public domain standard because it's been around a long time, has all the basic features, and shows up everywhere. But it's not your only, or even necessarily your best, choice for a disk editor. I've found at least 12 of these programs in the public domain, four of which are major contenders for the title of "Best Disk Editor."

DU2

DU2 was written by Richard Conn, the man responsible for ZCPR (a series of enhancements to CP/M). DU2 has the same basic functions and commands as DU-V88: you can move by track, sector, or group; display, edit, or transplant sectors; search for ASCII or hexadecimal strings; and so on.

But DU2 has two special features that set it apart from DU. One, where DU only lets you pick up a single sector at a time for transplanting, DU2 lets you pick up a sector, an allocation group, or even a whole file with one command, and then write it to disk somewhere else with another command. If you're trying to move some files off a crashed disk, you'll find this feature saves a tremendous amount of

time, not to mention tedious key-punching.

Two, DU2 allows you to build macro commands while you're working. You could, for example, assign the command sequence `CH00 00,CH20 00,CH40 00,CH60 00,W,D` to a single key. You could then browse through your disk directory and unerase all files in a sector with one keystroke.

DU2 was written to work with a computer running ZCPR2 instead of standard CP/M. You can run it on a standard CP/M system, but you'll have to use the ZCPR2 installation program (GENINS.COM, also public domain) to set it up.

SODU

SODU (Screen-Oriented Disk Utility) is another descendant of the original DU, which incorporates the enhancements of DU2 and adds some important ones of its own. Like DU-V88, SODU has all the basic disk editor functions. Like DU2, it allows you to build macros and to pick up either a single sector or a single group (but not, unfortunately, a whole file) with just one command.

SODU also adds four more very nice features. One, it automatically displays the current sector after any kind of move. So, instead of having to enter `G00;D` to move to group 00h and display its first sector, you just enter `G00`, and SODU displays the new sector without your asking.

Two, SODU stores your last command and lets you repeat it just by entering a carriage return. This feature makes it much easier to

scan a file, for one thing—just enter + and then keep hitting return.

Three, SODU uses a split screen. The top half shows the current sector, while the bottom half is used for help menus and other information—very handy.

Four, in addition to the standard DU method of changing bytes in a sector, SODU also has a "sector editor." You can actually move your cursor into the hexadecimal or ASCII display of the sector, move it to the position you want using your arrow keys, and then type in your changes directly. You can even jump from the hexadecimal display to the ASCII display or back again with a single keystroke. What's more, SODU automatically updates the screen when you make any kind of change (even from the command prompt, DU-style) so you don't have to re-display the sector.

SODU has one bug—its F command won't locate a file if the logical extent count in its first directory entry is set to 01h rather than 00h, which happens in the Kaypro 4 format with files over 16K. Also, SODU's M command for mapping the disk shows only active files, not erased ones—apparently an intentional omission rather than a bug. And finally, SODU so far has no documentation of its own; you have to use DU's or DU2's, though perhaps someone will write something for it soon.

SuperZap

SuperZap (the public domain version, not the commercial program of the same name) is a different

(continued on page 22)

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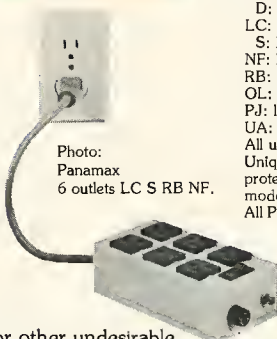
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P.C. Magazine, March 1983

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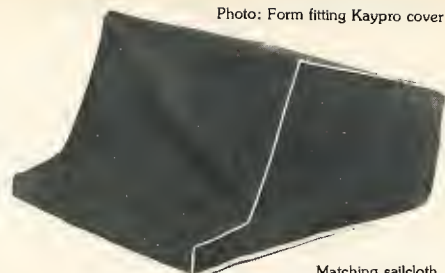


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Stop Tearing Up Your Disk Drives

If you're using your Kaypro as a printer buffer instead of a computer, you may be tearing up your disk drives. Disk drives are mechanical devices, they are often the first parts of a computer to go sour. No wonder. Everytime you feed your printer a file, the drives whirl madly until the printer has accepted the entire file. Sometimes this takes a long, long time.

If you're tired of hearing your disk drives grind down, you need a printer buffer. The best performance and price buffer on the market is the Consolink MicroSpooler. This computer-like tool absorbs files as fast as your computer can send them, and then patiently feeds or spools them to your printer a few bytes at a time.

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The MicroSpooler comes in a variety of configurations. You can link your Kaypro to any popular printer with two inexpensive cables. Please check our low MicroSpooler prices. You won't find a more feature-packed or reasonably priced spooler around. Try the MicroSpooler of your choice for 15 days. If you are not completely satisfied with your purchase, return it for an immediate full refund. Your Kaypro deserves this attractive and useful accessory. Order a compact and powerful MicroSpooler for your computer today. Works with all model computers.

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The Kaypro can dump a file faster than a printer can accept it. This device will catch the file, quiet the disk drives, and let you compute again.



Photo:
MicroSpooler
64 K P-P

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64 K Stores and spools files as large as 64 K.
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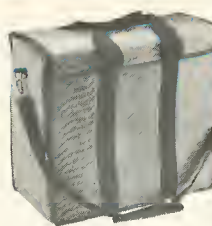
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kind of animal. Just as DU-V88, DU2, and SODU represent one theory about how a disk editor should work, so SuperZap (by Willie Davidson of Scotland) and the following program, Patch18a, represent another.

SuperZap can do most, though not all, of the usual track and sector editing that DU and its mates can do, and it has three important extras.

One, SuperZap is menu-driven, and the menus change as you move from one function to another. These menus are very nice for beginners and for people who use a disk editor only seldom.

Two, SuperZap (like SODU) has a sector editor. When you want to make changes in a sector, you actually move around the sector display, by using your arrow keys, until you find the spot you want, and then you type your changes in directly. As SODU does, SuperZap updates the sector display immediately when you make a change.

Three, SuperZap can access the disk either by tracks, sectors, and groups, or by files. This file-editing option is very useful. When you select a file to examine and possibly edit, you still move through it sector by sector, but SuperZap makes it appear that the sectors are in one continuous string. So, when you come to the end of one allocation group, you don't have to worry about where on the disk the next group is; SuperZap knows and moves you there automatically. SuperZap also treats the addresses in the file as continuous (rather than starting over at 00 with each new sector) so you know where you are in the file at all times.

SuperZap lacks two things that the DU family has. It gives you no way to move sectors or groups around on the disk. And it gives you no way to make mass changes or repeat actions—everything has to be done one byte or sector at a time.

There's also some conflict between the version of SuperZap I find in circulation (2.2) and the documentation file (SUPER-

ZAP.DOC) accompanying it. The DOC file says there's a way to move sectors from one place to another by using a scratchpad buffer; this function is missing from version 2.2. The DOC file says there's a way to reset the starting address of a file so that COM file addresses will start with 0100h instead of 0000h; this function is missing. And the DOC file says that there's a TYPE command to display a file in ASCII only; this function is also missing.

Patch18a

Patch18a, by Bill Rink, has the same theory about disk editing

Patch18a itself. I prefer DDT or a disassembler for poking around in memory.)

Patch18a also has its drawbacks. While the other programs mentioned were all written in assembly language, Patch18a was written in Pascal, so it's big—26K (DU-V88 is 8K, DU2 and SODU 12K, and SuperZap only 6K). It has no command that allows you to move around the disk by allocation groups, only by tracks and sectors. And it also has no command for moving sectors or groups around on the disk.

While in its file-editing mode,

*SODU is a descendant
of the original DU,
which incorporates
enhancements of DU2.*

that SuperZap does. It keeps some kind of menu onscreen at all times, allows sector editing using cursor control and direct entry of changes, and has the very useful file-editing option. But that's not all Patch18a has, by any means.

Unlike SuperZap, Patch18a lets you adjust the starting address when you're using the file-editing option. So, when you edit a COM file (a program), you can set the starting address to 0100h, where programs usually run, instead of 00-00h. This feature makes Patch18a a delight for patching WordStar or other programs. You'll find that entering a complicated series of patches is much easier with Patch18a than with DDT, and when you're done, you don't have to use the tricky CP/M SAVE command.

Patch18a also has another interesting feature—a "memory editor." This editor has many of the functions of Patch18a's disk editor, only it lets you display and modify the contents of your computer's RAM (Random Access Memory). (To be honest, I don't find this feature very useful, since most of what you can see with this memory editor is

Patch18a does have an overlay command that will move a specified number of sectors into the file being edited. But this command doesn't take the place of full-fledged transplant commands, and it's difficult to use, in any case, because you must specify (by track and sector) *where* on the disk the overlay is to come from.

And my vote goes to . . .

SODU. I love it. It can do practically anything with a disk, and all it needs to make me completely happy is the file-editing mode of SuperZap and Patch18a.

Patch18a is also an interesting and popular program, especially for patching files (its main purpose in life). But I hate giving up so much space on my already crowded disks. Besides, both Patch18a and SuperZap lack the ability to move sectors around, something that's often crucial when I'm trying to rescue a crashed file or disk. Still, where I've got room, I have both SODU and Patch18a.

Next month—SideKick on a Kaypro 2? □

"the clearinghouse for public domain software on the West Coast," you must send in an application. Until you send in your application, logging onto the board is a waste of time (and money), as only registered users are allowed past the front door. A first-time log-on provides only the instructions for completing a membership application (which I've provided for you below).

There are no membership fees, but you must send a self-addressed stamped envelope enclosed in a letter with the following information:

1. Your first and last name.
2. Your city and state.
3. Your chosen password. It must be at least four alphanumeric characters long.
4. Your area code and phone number, along with when and where you can be reached *by voice*.
5. A description of your hardware—CPU, disks, modem speed (300/1200/2400), etc.
6. Your operating system(s)—Apple-DOS, PC-DOS, CP/M, etc.

Send all this to Wayne Masters, O/85-76 B-103, P.O. Box 3504, Sunnysvale, CA 94088.

After verifying that you are for real, and not a prankster, Masters mails you notification of your registered status along with documentation on how to use the board. (Nice touch.)

This board carries some incredible programming tools. Potpourri's "High Order Language" section contains every available public domain assembler, along with utilities for Small-C, UniForth, Forth, CBASIC, CP/M, MP/M, etc. JRT Pascal can be downloaded for free.

Though this board offers impressive tools, its most valuable resource is its user base.

"We like to emphasize the personal side to programming," says Masters. "I enjoy giving out my home phone number and being able to talk someone through a particular problem. Irv [Hoff, assistant sysop] feels the same way."

If you've always wanted to hash out your ideas with some of the

heavyweights, this is the place. Being a member of Potpourri gives you an extra privilege: Users of Potpourri are often the first to see a program because the developer is online and uses the "locals" for beta testing.

Kudos

I thank all who have contributed to

the effort of public domain software. I offer this information to the late-night programmer stuck on that bug-ridden subroutine, or to the user seeking an operating system utility, in hopes it will ease your mind some night—when your frustration level approaches critical mass—to know that you can dial up a sort of electronic cavalry.

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Programming: From BASIC to Turbocharged

Leaving "spaghetti" code behind with Turbo Pascal

by Steve T. Jones

Turbo Pascal is the biggest news in programming languages for microcomputers since BASIC first became the standard. According to Turbo's publisher, Borland International, more than 300,000 copies have been sold. The reason is simple: Pascal has power and versatility and Turbo is a very good implementation of it.

Pascal is completely unlike BASIC. BASIC is linear; a program consists of a single continuous string of instructions. Pascal is a modular language. A Pascal program is a collection of related components—data structures, functions, and procedures—each one written to solve a part of the problem. This fundamental difference can make Pascal difficult for the BASIC programmer to master. The following comparison of features may help with the transition.

If you have experience with S-Basic, you will find much that is familiar in Pascal. If you have used another version of Pascal, you should be aware that Turbo offers many additional features beyond "standard" Pascal. The manual provides a comparison between "standard" Pascal and Turbo.

What is Turbo Pascal?

Pascal, which has enjoyed wide acceptance as a language for teaching programming principles, is based on concepts developed by Swiss mathematician Niklaus Wirth. A program, according to Wirth, has two parts: (1) the data it works on, which should be organized to suit the application, and (2) a set of procedures for manipulating the data that will produce the desired results. Pascal provides the programmer with flexible mechanisms for creating data structures and for specifying processing steps.

Borland's version, while still a fine teaching language, is also a serious development tool. The Turbo compiler, unlike many others, produces executable .COM files (.CMD files under CP/M-86). These stand-alone programs are reasonably compact and run

almost as fast as programs written in assembly language—much faster than programs written in interpretive languages like MBASIC.

The compiler is quick, gobbling up source code in 16-line chunks. It is part of a well-integrated programming environment that is managed with a menu; this allows the programmer to select among available functions with a single keystroke. In addition to the compiler, Turbo provides a very good WordStar-like editor for writing and modifying programs. You can also run a program from the menu and perform other housekeeping tasks as well. Using the menu is more convenient than typing MBASIC commands.

The combination of Turbo's fast compiler, the editor, and the single-key menu add up to a graceful transition between editing and running a program. A sequence of four or five keystrokes terminates the editor, invokes the compiler and runs the compiled program. If the compiler detects an error, a message is displayed and you are sent back to the editor with the cursor on or near the error. This procedure "feels" right; bouncing around between writing and running a program is nearly as convenient in Turbo Pascal as it is in MBASIC.

Defining your data

MBASIC does not provide a true constant. You can assign values to variables at the beginning of a program, but you can change these values at any time—either intentionally or accidentally. Pascal allows you to define constants whose values are assigned when the program compiles.

Turbo includes most of the same data types as MBASIC—string, integer, and real numbers. (Turbo has only one "Real" type, which has 11 digits of accuracy.) In addition to these, Turbo offers a "Boolean" data type (true or false), and two single-byte data types—"Char" (character) and "Byte". You are not limited to these data types, however. If another type is required, you can define your own, using any of the predefined types as

building blocks. You can also create subranges of other types and arrays of any type.

Perhaps most important of all, you can define records—groups of variables that may be of different types. A person's full name, for example, consists of two separate but related items, a first name and a last name. Each may be used separately or both may be used together:

```
FullName = Record
  FirstName : String[12];
  MiddleInit: Char;
  LastName  : String[18];
End;
```

MBASIC variables need not be defined. The data type of each MBASIC variable is usually determined by the last character in its name. In contrast, Pascal requires explicit declaration of each variable, which may mean a great deal of additional coding. It does, however, enable you to structure your data to more closely meet your application's requirements. You work with your data as related groups of variables instead of as disconnected individual variables.

The first part of a Pascal program consists of declarations of constants, data types, and variables. These definitions are said to be "global." Global definitions apply throughout a program; MBASIC variables are always global. Pascal also allows the use of "local" variables, as we will see below.

Program structure

MBASIC's numbered lines of code cause you to treat a program as one long sequence of steps, with GOTOs and GOSUBs referring to line numbers. Subroutines become locations, not necessarily operational units related to a real-world problem. In contrast, a Pascal program is made up of named functions and procedures.

Pascal functions are similar to MBASIC functions—little sub-programs that return a value. They are used in expressions where the returned value replaces the function call. Turbo provides many built-in functions and, like MBASIC, allows you to write your own functions. But while MBASIC severely limits what you can do in a function, Turbo enables you to define a function that can perform virtually any task. Functions can call other functions or procedures (see below), even themselves. (Such "recursive" functions should be approached with caution, however.) They can define their own constants, data types, and variables and they can declare their own functions and procedures as well.

Anything defined within a function declaration is "local" to that function—it does not exist outside that function. Therefore, other functions could also contain definitions using the same names.

Procedures are similar to functions, except that they do not return a value. Their use represents a fundamen-

tal difference between BASIC and Pascal. BASIC uses fixed instructions that perform specific machine operations. The entire program must be made up of these statements. Pascal uses only a few fixed instructions. Most of Turbo's processing is done through procedures. You can write new ones and, if you're brave, rewrite the predefined ones. Like functions, procedures can declare their own local constants, data types, variables, functions and procedures.

Compared with MBASIC, Pascal provides a wider variety of statements for controlling program execution. And all of them may be combined and nested to any level with any of the others. "Repeat/Until," "While/Do," and "For/Do" (no "NEXT" required) are available. "If/Then/Else" with compound conditions and a true "Case/Else" statement round out the selection. There is even a "Goto" statement.

The key to combining and nesting these control statements is a characteristic called "block structuring." A block-structured language allows the programmer to substitute a block of statements anywhere the language's syntax calls for a single statement. A block is any sequence of statements beginning with the word "Begin" and ending with the word "End;". Within a block, of course, another block can substitute for a single statement, and so on. In the example below, the syntax for the "If/Then/Else" is on the left. On the right, two levels of block structuring have produced a much more complicated structure:

<pre>If (expression) Then (statement) Else (statement);</pre>	<pre>If (expression) Then Begin If (expression) Then (statement) Else Begin (statement) (statement) End; (statement); (statement); (statement); End Else (statement);</pre>
---	---

Other differences

Turbo also provides a full range of I/O facilities. Procedures are available for processing text files as well as sequential and random files. Here, too, Turbo offers welcome improvements over MBASIC. For one, opening an existing sequential file for output ("Reset" procedure) does not destroy the contents of the file as it does in MBASIC. For another, the record data type described above can be used for I/O. This means that complex data records can be used in both sequential and random files. It is not necessary to convert numeric data to strings and move them into a buffer.

Turbo provides exceptional access to the lowest-level machine functions. In addition to operations that correspond to BASIC's PEEK, POKE, and OUT, you can execute direct calls to the operating system and include hand-assembled machine code.

A Turbo Pascal program can chain to another Turbo Pascal program or initiate any another program. Turbo also provides a sophisticated overlay scheme that enables the experienced programmer to write programs larger than the Kaypro's memory.

Finally, Turbo Pascal has some other features that do not resemble anything in MBASIC. Pascal programs use free-form coding. Semicolons mark the ends of statements and a period marks the end of a program. Spaces—including blank lines—between statements are ignored. Blocks of code can be indented and set off with blank lines to show different levels of nesting. Most statements can be spread over several lines to improve readability. Comments can appear before, following, or even in the middle of statements.

Pascal includes a "Set" data type. This enables you to define sets and perform a full range of logical operations on them. Sets are useful, for example, for validating user responses. Instead of requiring an IF statement for each valid reply, Pascal makes it possible to test a variable for membership in a set of valid responses:

```
WriteLn('Do you wish to continue (Y or N)');
Repeat
  Read(Kbd, Answer);
Until Answer In ['Y', 'y', 'N', 'n'];
```

Pascal also allows, with some restrictions, the allocation of memory while a program is running. Declared variables are assigned memory locations when the program is compiled. "Dynamic" variables can be created by the program as it needs them. Games, artificial intelligence applications, and complex indexing routines are typical candidates for this capability.

Getting started with Turbo

The best way to get started writing Turbo Pascal is to start thinking in Pascal. Think about the application, not the computer. When you look at a programming problem, ask yourself if Pascal offers a technique for solving it that is better than BASIC's approach. As you gain experience, the answer will more often be "yes."

The following compendium of tips, suggestions, and—I admit it—outright prejudices may be helpful.

1.) Forget most of the programming habits you developed while writing BASIC (except the habit of saving your work occasionally). Develop new ones. Work especially hard at forgetting GOTO.

2.) Become more familiar with what Pascal can do. Study Pascal programs that work. The manual has many examples. The Turbo program disk also contains

example programs including a spreadsheet. Refer to any Pascal text or to some of the sources listed in the bibliography at the end of this article.

3.) Pascal is more complex than BASIC but its complexity is well thought-out and organized. Digest it in small chunks.

4.) Turbo's fast compiler invites you to fool around and experiment. Do it.

5.) Structure your data.

6.) Plan ahead.

7.) Use Turbo's dual comment delimiters for debugging. Use brackets { . . . } for documentation purposes and use parentheses/asterisk combinations (* . . . *) to "comment out" (disable) blocks of code. For example, you may want to display some variables for diagnostic purposes while you are debugging a routine. When everything seems to be working, enclose the diagnostic procedures in (* and *) and re-compile. If you still have problems, delete the (* and *) and try again. When finished, use the block delete function to get rid of all your diagnostics. Or leave them in—who will know?

8.) The exception to Tip #1 is to "Goto" the end of a procedure when an error condition makes it pointless to continue. You must define a label to go to.

9.) If you have lots of "If" statements, you may need a single "Case" statement instead.

10.) Consider "For/Do" loops carefully. You may be better able to duplicate the logic of the real world with either "Repeat/Until" or "While/Do".

11.) Complicated tasks are built up from simple ones; so are complicated programs. Break down your complex process to a lot of little, simple ones and then write a procedure or function to accomplish each one.

12.) Comment freely. Remember, Turbo exacts no penalty in execution speed for extensive comments.

13.) Use a null statement ("Begin End;") for testing higher-level routines or control structures when the lower-level ones haven't been written yet.

14.) If you want to convert an existing MBASIC program, consider it a complete rewrite. Take the opportunity to iron out the rough spots and make a more elegant program.

About Turbo Toolbox

Borland International offers the "Turbo Toolbox" to extend the power of Turbo Pascal. The toolbox is a collection of Pascal functions and procedures together with programs to illustrate their use. A manual is included. The package includes routines for indexed sequential files, an on-disk sort, and a generalized version of Turbo's terminal installation program for software developers. □

Steve T. Jones has worked as a programmer, systems analyst, and project leader on a variety of systems. He currently teaches at East Central College in Union, Missouri, and does private consulting.

For more information, see page 28.

Bibliography

Additional information can be found in the following books. Another excellent source is "TUG Lines," the publication of the Turbo Users Group (P.O. Box 1510, Poulsbo, WA 98370). Membership in TUG is \$30 per year and includes six issues of the newsletter. A recent issue, for example, included a round-up of Version 2.0 bugs and nuisances together with fixes. Publication dates seem to be somewhat erratic. Special interest bulletin boards dedicated to Turbo Pascal have also begun to appear. (Are you listening, Brock Meeks?)

"Turbo Tutor," Borland International, Scotts Valley, California, 1984. A helpful tutorial; comes with a disk that includes source code of all examples. Because it is specific to Turbo Pascal, it explains all of Turbo's extensions.

Brown, Peter; *Pascal from BASIC*, Addison-Wesley, Reading, Massachusetts, 1982. Written for BASIC programmers. See accompanying review.

Higgins, David; *Program Design and Construction*, Prentice-Hall, Englewood Cliffs, New Jersey, 1979. Presents a very structured technique for designing programs, similar to the method I teach in my program

design course. Uses BASIC as the example language, but the approach is perfect for Pascal.

Schneyer, R.; *Modern Structured Programming*, Mitchell, Santa Cruz, California, 1984. College-level text. Presents a variety of approaches to program design and testing. Uses Pascal, 8080 assembly language (as used on the Kaypro) and other languages for examples. Good introduction for serious programmers.

Seiter, Charles and Weiss, Robert; *Pascal for BASIC Programmers*, Addison-Wesley, Reading, Massachusetts, 1983. Title says it all. See accompanying review.

Two Ways to Get From BASIC to Pascal

Pascal from BASIC \$12.95
by Peter Brown

Pascal for BASIC Programmers \$10.95
by Charles Seiter and Robert Weiss

Both of these books provide a thorough comparison of

(continued on page 46)

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by Steve T. Jones

To speed the transition from MBASIC to Turbo Pascal, the following offers a taste of just how the commands of Microsoft BASIC (Version 5.21) relate to their nearest counterparts in Turbo Pascal (Version 3.0). The six page unabridged version can be downloaded from the ONKUG RBBS, at 300 or 1200 baud, 24 hours a day, by dialing (619) 259-4437.

SELECTED MBASIC COMMANDS

AUTO
CALL

CHAIN

COMMON

DEF FN

GOSUB

GOTO

IF/GOTO

IF/THEN/ELSE

LOAD

REM

RESET

RUN (interpreted)

SAVE

SYSTEM

WHILE/WEND

(assignment) =

-

+

*

/

\

MOD

NOT

AND

OR

XOR

(equality) =

N/A

N/A

N/A

NEAREST TURBO PASCAL COUNTERPARTS AND RELATED VARIATIONS

No line numbers required

Procedure name; External address;

Inline(machine code);

Overlay Procedure procedure name;

Overlay Function function name;

Chain(program);

Execute(program);

automatic if manual's conventions are observed

Var name : type Absolute address;

Function name(parameter list) : type;

Begin

statement(s);

End;

procedure name;

Goto label;

If condition Then Goto label;

If condition Then statement(s) Else statement(s);

Menu - Workfile function

(comment) or (* comment *)

Menu - Log Drive function

Menu - Run function (compiled)

Menu - Save function

Menu - Quit function

While condition Do statement(s);

: =

-

+

*

/

div

mod

not

and

or

xor

=

shl - bitwise shift left

shr - bitwise shift right

in - set operator

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CAT2: Programs which create and maintain a directory of all programs on your disks. Keeps track of programs which are and aren't backed up.
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- K18 SYSTEM DIAGNOSIS** - Just as we finished editing the routines on this disk, we received a copy of KayPro's diagnostic disk. The memory test and drive exercise routines on this disk are more powerful than KayPro's versions. (Plus, it's only \$12) Setup for KayPro II & 4.
- K21 SBASIC ROUTINES & SCREEN DUMP - SBASIC:** Finally a disk of SBASIC software. Good examples of structured programming (including one program written both ways so you can see the difference).
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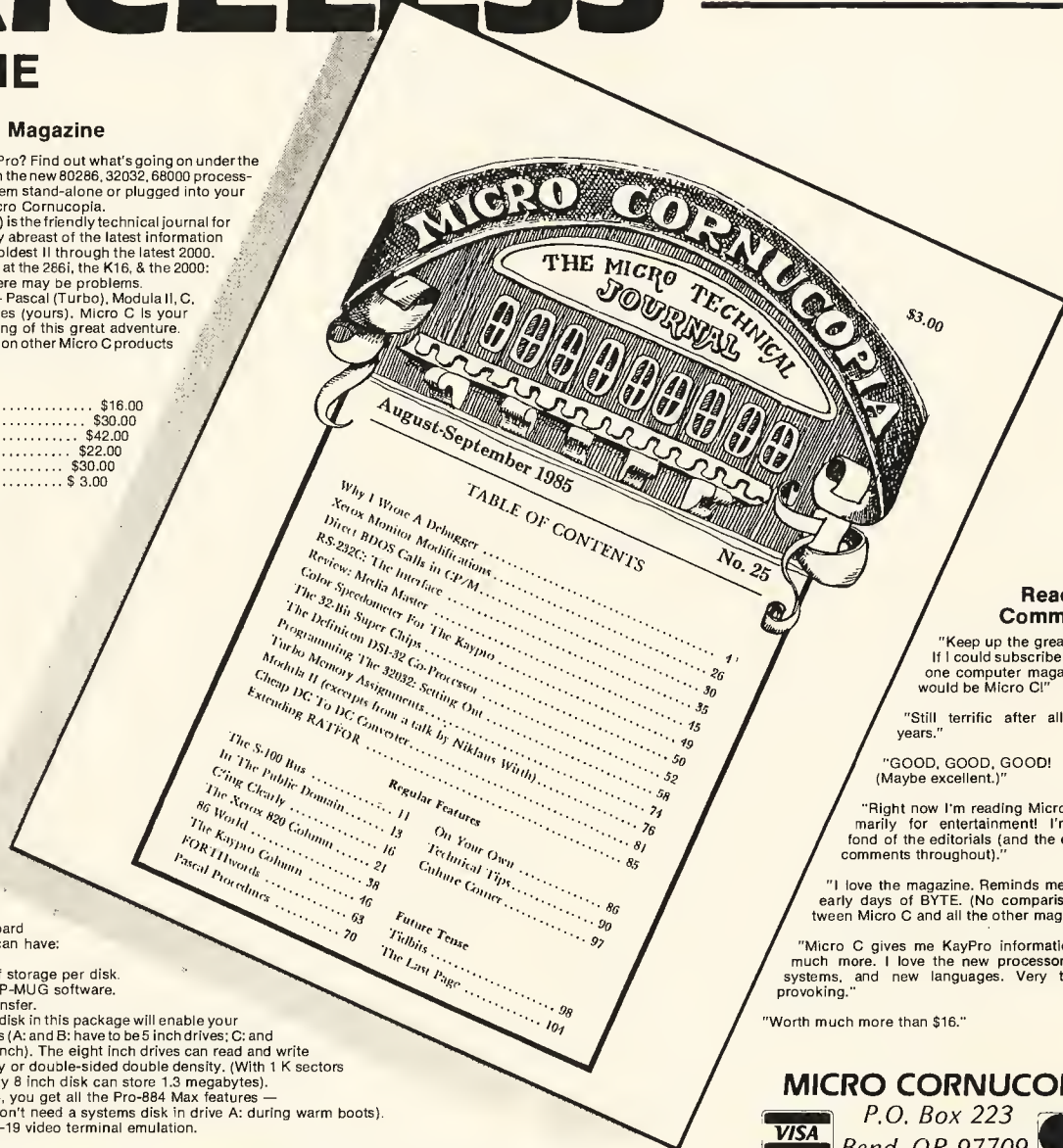
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Assorted Sorts

How to get your data in order

by T. F. Chiang

Putting things in order—it's one of the operations performed most often when dealing with both numerical and non-numerical data. The familiar term for this is "sorting." We want every collection of information we have to be sorted in one way or another. Whether they're books in a library, words in a dictionary, numbers in a list, or names in a file, all of them have to be sorted into a particular order.

The reason for sorting is obvious: Without it, we'd never be able to find anything. Think of locating a name in the telephone book; it would be impossible if the entries were not listed alphabetically.

In programming, the number of operations needed to locate a specific value during a search is greatly decreased if the data is sorted. A computer might have to look through an entire list to find a certain item if the list were unsorted. However, if the list were sorted, the number of comparisons would become trivially small. For instance, one number in a sorted list of a million could be found in only 20 comparisons, instead of a million.

If you're writing a database program, or some other program that will have to handle even a moderate amount of information, you'll probably want a means for the computer to sort values. You'll need a sorting algorithm, a step-by-step method of arranging values in order, and it should be appropriate for your particular application.

There are all sorts of sorts (sorry). There are a great many algorithms we might use for sorting. Some are very effective; others are agonizingly slow. Here we'll look at three—one fair, one good, and one excellent.

These sorts are presented in S-Basic. The code is Pascal-like, rather than MBASIC-like, because of the benefits of structured coding. The sorts should be easier to understand this way, and you'll be able to translate them easily into other structured languages.

To use a sort in a structured program, you're best off calling it through a procedure. It's also easiest to have the sort work on values in an array, doing everything in internal memory. Some applications, such as sorting

records on a disk, may require other techniques that are more complicated, but this particular method should be quite suitable for tasks like printing alphabetized listings. Do remember that a sort should be general enough to work on an unknown number of elements, so the precise length of the sequence you'll be dealing with will be passed through the parameters of the procedure.

The bubble sort

This is possibly the simplest sort around. It's the kind of algorithm a person might stumble across accidentally when trying to figure out how to sort some numbers. It is one of many similar sorting methods, all equally simple.

The program merely looks through a series of numbers, starting at the beginning. If the numbers are in order from lowest to highest, fine. But if one is out of order—if it's bigger than the one after it—then the two numbers are switched. The program continues through the list, switching each pair of numbers that's not right, until it's gone through the entire series once. If you think about it, you'll see that the biggest number has "bubbled" up to the high end in this process. Now the program starts over again from the beginning, and if each pair of numbers is still not in order, they're swapped again. This is repeated over and over, with large numbers bubbling upward, gradually forcing smaller numbers down. After enough repetitions, there will be no more swaps, and the numbers will be in order. (See accompanying article, Example 1.)

Take a look at Listing 1, below; it's straightforward. The variable called "Swapped" controls the operation. It tells you that a pair of numbers has been switched, which means the sort is not done. Only when it's possible to go through the entire sequence without swapping any numbers is the array sorted correctly.

The problem with the bubble sort is its speed. It's too slow for use on anything more than a handful of values. For small sequences of numbers—around 20 or so—it may be the best choice because it's such a simple

operation. But for long sequences of numbers, it's just not practical; bubbling repeatedly through hundreds or thousands of numbers takes an incredibly long time.

```

Rem SBasic bubblesort
dim real numbers(500)
procedure bubblesort (length = integer)
var index, swapped = integer
var temp = real
  repeat begin
    swapped = 0
    for index = 1 to length-1
      if numbers(index) > numbers(index+1) then begin
        temp = numbers(index)
        numbers(index) = numbers(index+1)
        numbers(index+1) = temp
        swapped = 1
      end
    next index
  end until swapped = 0
end

```

LISTING 1: SBasic Bubblesort Program

The bubble sort is good for short sequences or for long ones that are almost totally in order already. But for real work, such as sorting lengthy series that are well mixed up, something better is needed.

The Shell sort

This sort, quite a good one, is named after its inventor, D.A. Shell. It is based on some improvements made on a simpler type of sort. The details of its implementation vary, but the principle is as follows.

The Shell sort's improved performance is based on the idea that it's better to operate over large distances than small ones. In the bubble sort, only adjacent numbers were compared; with this algorithm, numbers far apart in the sequence are compared. The sequence is sorted coarsely first and is then refined.

The size of a "gap" is important here; it is the distance over which numbers in the array will be compared. In the beginning, the gap is one-half the entire length of the sequence. The numbers at either end of this gap—for example, the first and the 51st elements in an array of 100—are compared. If they're not in correct order, they are swapped.

The gap range is then moved over one number, so that the second and 52nd numbers are compared, and so on. (See Listing 2, below.) Swapping occurs as necessary as the range slides toward the end of the array. When the range reaches the 50th and 100th numbers, the array has been very coarsely sorted; the numbers in the first half have an average value smaller than the numbers in the second half.

Now the gap is cut in half. Numbers 25 spaces apart in the array are compared. This smaller range moves down the array, and again numbers are swapped as necessary. Whenever a swap is made, the algorithm reverses direction, in steps the length of the gap, to re-

sort any small numbers previously encountered. When this is complete, the array has been sorted into four rough sections (whose average values are in order). The gap is cut in half again and again, and the numbers get closer and closer to being in true ascending order. When the gap has shrunk from 50 to one, you have a relative of the bubble sort, and the array is completely ordered. (See accompanying article, Example 2.)

```

rem SBasic shellsort
dim real numbers(500)
procedure shellsort (n = integer)
var index, j, distance, gap, swapped = integer
var temp = real
  gap = n
  while gap < > 0 do begin
    gap = gap / 2
    distance = n - gap
    for j = 1 to distance
      index = j
      swapped = 0
      repeat begin
        if numbers(index+gap) > numbers(index) then
          swapped = 0
        else begin
          temp = numbers(index+gap)
          numbers(index+gap) = numbers(index)
          numbers(index) = temp
          index = index - gap
          swapped = 1
        end
      end until (index<1) or (swapped = 0)
    next j
  end
end

```

LISTING 2: SBasic Shellsort Program

This is obviously much more efficient than the bubble sort, because the coarse steps of the operation do much of the work. However, this sort retains a characteristic of its simpler cousins: it still has to resort the whole sequence again and again before getting the numbers precisely in place. This is time consuming. The Shell sort works far better than the bubble sort, but it's not the best.

The Quicksort

This algorithm, invented by C.A.R. Hoare, is probably the best sort available for general purposes. It is fast—hence the name—and it works in a clear and logical manner. It was designed to use recursion to great advantage, and it does. (Recursion is when a procedure calls itself; see the article in the July-August 1984 issue of *PROFILES*.) There are many variations, some non-recursive, for use in different situations. The one shown here is a standard version.

What the Quicksort does is similar to what you would normally do if you had to sort a large number of, say, file folders. Given hundreds of folders to sort, would you just start slipping them into some kind of order, one at a time, like the bubble sort? I hope not.

No, what you would do is sort the files into sub-groupings—A-M and N-Z, for example. Then you would

go to work on each pile, having a smaller job that is much easier to handle. (See Listing 3.)

```
rem SBasic quicksort
dim real numbers(500)
procedure qsort( first, last = integer )
var lower, upper = integer
var pivot, temp = real
  lower = first
  upper = last
  pivot = numbers( (lower+upper) / 2 )
  repeat begin
    while numbers(lower) < pivot do lower = lower + 1
    while numbers(upper) > pivot do upper = upper - 1
    if lower <= upper then begin
      temp=numbers(lower)
      numbers(lower)=numbers(upper)
      numbers(upper)=temp
      lower = lower + 1
      upper = lower - 1
    end
  end until lower > upper
  if first < upper then qsort first, upper
  if lower < last then qsort lower, last
end
```

LISTING 3: SBasic Quicksort Program

First of all, it takes the element in the middle of the array and names it Pivot. Ideally, this would also be a value near the middle of the range of values to be sorted

(e.g., near 50 if the numbers were between 1 and 100). However, it doesn't have to be.

Next, Quicksort divides the numbers into two groups—one with all values lower than Pivot, the other with all values higher. It does this by examining the array from the ends, moving toward the middle. If in the first half of the array it finds a value larger than Pivot, it stops and checks the second half. There it looks for a value smaller than Pivot. Since these two values are on the wrong sides of Pivot, they are swapped. Quicksort continues, switching values that aren't on the correct sides until it reaches the middle (Pivot). Now all the elements before Pivot are smaller and all those after it are larger.

Having gotten off to a good start, Quicksort now begins the real work, utilizing recursion. At the end of the operation, Quicksort *calls itself*; it goes back and uses its own algorithm to continue what it's already started. It does not give the entire array of numbers as the parameters. Instead, it calls itself to sort out each of the two subsequences that it just separated. It will call itself again and again until it sorts out the entire sequence.

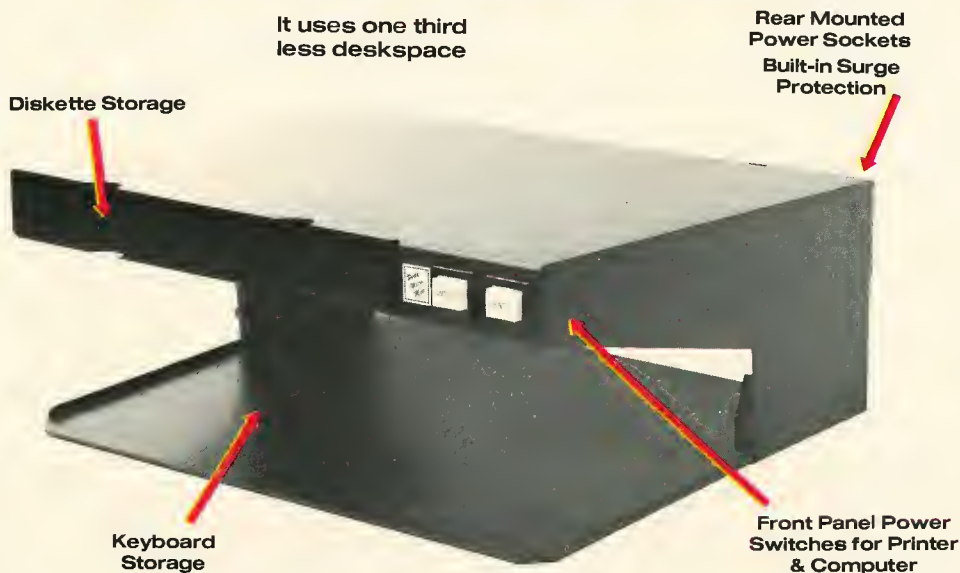
If you were following this procedure in our hypothetical situation with the file folders, you'd work on the

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WATCHING THEM WORK

Here are the three algorithms, working on a sequence of ten integers, with the swaps shown and numbered to give you some idea of how they operate. Each line has in boldface the numbers which are switched in the following line. Note: this is too short a string to do accurate time comparisons.

ITERATION NUMBER

:	TEN INTEGER SEQUENCE AND SWAPS ON EACH ITERATION																		
1:	98	<-	44		10		34		57		56		8		90		76		98
2:	44		98	<-	10		34		57		56		8		90		76		98
3:	44		10		98	<-	34		57		56		8		90		76		98
4:	44		10		34		98	<-	57		56		8		90		76		98
5:	44		10		34		57		98	<-	56		8		90		76		98
6:	44		10		34		57		56		98	<-	8		90		76		98
7:	44		10		34		57		56		8		98	<-	90		76		98
8:	44		10		34		57		56		8		90		98	<-	76		98
9:	44	<-	10		34		57		56		8		90		76		98		98
10:	10		44	<-	34		57		56		8		90		76		98		98
11:	10		34		44		57	<-	56		8		90		76		98		98
12:	10		34		44		56		57	<-	8		90		76		98		98
13:	10		34		44		56		8		57		90	<-	76		98		98
14:	10		34		44		56	<-	8		57		76		90		98		98
15:	10		34		44	<-	8		56		57		76		90		98		98
16:	10		34	<-	8		44		56		57		76		90		98		98
17:	10	<-	8		34		44		56		57		76		90		98		98
END:	8		10		34		44		56		57		76		90		98		98

EXAMPLE 1: Bubble Sort. Only adjacent numbers are swapped here. The first pass over the sequence moves the 98 to the end, but in eight swaps; the next pass moves some other large numbers over. The last four passes over the sequence are required to push the little 8 back to the front.

ITERATION NUMBER

:	TEN INTEGER SEQUENCE AND SWAPS ON EACH ITERATION									
1:	[98	44	10	34	57	56]	8	90	76	98
2:	56	[44	10	34	57	98	8]	90	76	98
3:	[56	8	10]	34	57	98	44	90	76	98
4:	10	8	56	34	[57	98	44]	90	76	98
5:	10	8	[56	34	44]	98	57	90	76	98
6:	10	8	44	34	56	[98	57	90]	76	98
7:	[10	8]	44	34	56	90	57	98	76	98
8:	8	10	[44	34]	56	90	57	98	76	98
9:	8	10	34	44	56	[90	57]	98	76	98
10:	8	10	34	44	56	57	90	[98	76]	98
11:	8	10	34	44	56	57	[90	76]	98	98
END:	8	10	34	44	56	57	76	90	98	98

EXAMPLE 2: Shell Sort. The brackets indicate the ends of the gap. Two swaps are made before the gap is halved; then swaps are made over the smaller gap. When a swap is made, the gap jumps back one gap-length (at iteration 5) to move the 44 back more. After the pass is completed, the gap is reduced again, and swaps are made in vaguely bubblesort fashion.

ITERATION NUMBER

:	TEN INTEGER SEQUENCE AND SWAPS ON EACH ITERATION									
1:	(98	44	10	34	57	56	8	90	76	98)
2:	(98	44	10	34	57	56	8	90	76	98)
3:	(8	44	10	34	56)	57	(98	90	76	98)
4:	(8)	10	(44	34	56)	57	(98	90	76	98)
	8	10	34	(44	56)	57	(98	90	76	98)
5:	8	10	34	(44)	56	57	(98	90	76	98)
	8	10	34	44	56	57	(76)	90	(98	98)
	8	10	34	44	56	57	76	90	(98)	98
END:	8	10	34	44	56	57	76	90	98	98

EXAMPLE 3: Quicksort. The first pivot is 57, and the first numbers to be swapped are 98 and 8. After the second swap, the series is divided into two subsequences. Working on the first half, we swap a pair of numbers, and then we have two small, uneven sequences. The latter of these is sorted after swapping 34 and 44, and we can proceed to the rest of the series. 90 is the pivot here, and only one swap is needed, breaking it up into two small sequences that have already fallen into order.

A-M pile first. You'd divide it into two more piles, A-F and G-M. Then you'd continue dividing bigger piles into smaller ones until each pile contained one folder. Then your folders would be in order.

It looks confusing, especially when you try to follow all the procedure calls that Quicksort is making, but you can see what it's doing. First, it tries to sort the

The Quicksort is probably the best available for general purposes.

lower half by dividing it into two smaller subseries of larger and smaller numbers. It divides the lower subseries into smaller sections until it reaches a single element. It then sorts the upper subseries. Once it's gone through everything, it will have switched all the numbers into correct ascending order. (See accompanying article, Example 3.)

How is this better than the previous two sorts? It doesn't waste as many moves; it's always working efficiently. Quicksort makes its comparisons on a large scale and does coarse sorting first, then continues efficiently with recursion. The algorithm is pretty simple, which means that it works fast.

Is the Quicksort the fastest sort of them all? Sometimes yes, sometimes no. One problem is that the performance of all sorts depends on the precise order of the elements; in the worst case imaginable, the speed of all sorts decreases. For Quicksort, the worst case reduces it to a crawl; it becomes almost as slow as an average bubble sort. There are some ways to speed it up; one possibility is to make the value of Pivot really close to the average value of the elements in the sequence, so the subsequences would be closer to the same size.

(One good sort whose performance is more consistent than Quicksort's is the Heapsort. It is a complicated algorithm, and its average speed is slower than Quicksort's. However, its worst-case speed is better, so it is sometimes used commercially.)

Picking your sort

Which sorting algorithm should you choose? Don't immediately jump for Quicksort, because it's not always appropriate. For instance, MBASIC doesn't allow recursion, so you'll either have to wrestle with the complicated non-recursive version of Quicksort or use one of the other sorts. Recursion also takes up a lot of internal memory, as it needs space for each procedure call; sorting a great deal of data will require a non-recursive method (or else you'll have something called "stack overflow").

The speeds of the sorts vary with the quantity of

items being sorted. The bubble sort slows down rapidly as the number of items grows. Quicksort is not exceptionally fast on small quantities, but is very good on large ones, so a small sorting task—say, alphabetizing your address book—might not require Quicksort. The bubble sort or Shell sort may be perfectly adequate and is definitely easier to deal with (the bubble sort is especially easy to code).

Finally, how do these sorts compare against each other in practice? The times taken by the sorting algorithms are shown in Table 1 below. The programs in Listings 1 through 3 above were compiled in S-Basic on a Kaypro II running at 2.5 MHz. The numbers sorted were real numbers produced randomly by the RND function of S-Basic, which supplies the identical sequence on each run. Two different array sizes were used: 100 elements and 500 elements. Take a look at the results, and you can decide which one is your sort. □

T.F. Chiang is a student entering Brown University as a freshman this fall.

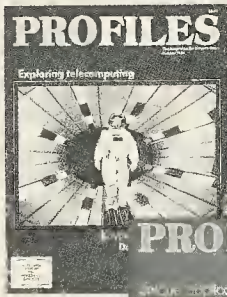
ALGORITHM	Timing Results	
	-----ELEMENTS IN ARRAY-----	
	100	500
Bubble Sort	00:45	21:06
Shell Sort	00:08	1:08
Quicksort	00:04	0:27

TABLE 1: Rough Sort Program Benchmarks in MINUTES:SECONDS (using SBasic programs from Listings 1 through 3).



It's strange, but every time I bring some work home, we have a brownout—

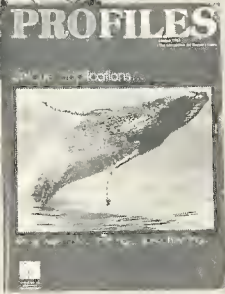
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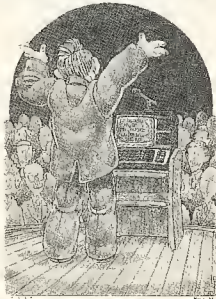
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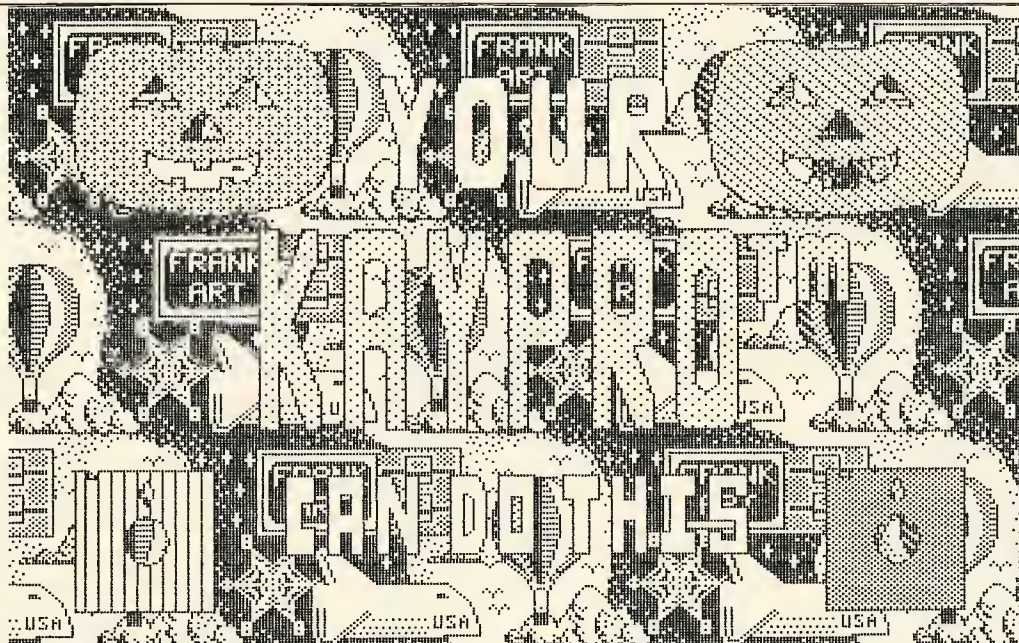
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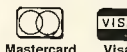
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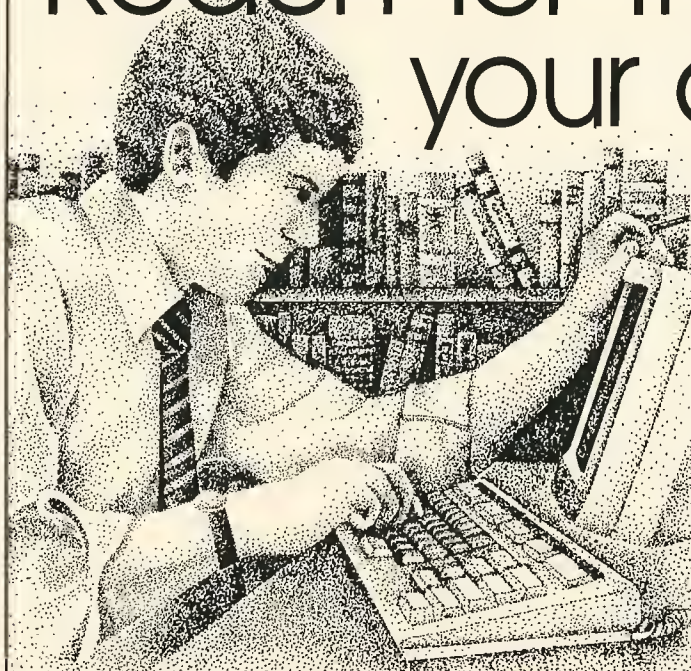
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Oh, Say Can You "C"?

The inside story

by Alan Winston

Do you want to write programs that run more than ten times faster than BASIC programs? Do you want to write programs that get at the lowest levels of your computer without your having to learn assembler? Are you interested in writing programs that can compile and run on every kind of computer from an eight-bit micro to the biggest IBM mainframe? C lets you do all these things.

What is C?

C is a compiled language, rather than an interpreted language like Microsoft's MBASIC. The *C compiler* translates the C source code into assembly language, and the *assembler* translates that into machine code. This means that when a C program runs, machine code is executed directly, while a BASIC program must be decoded by the BASIC interpreter, which then follows the program's instructions—a slow process at best.

C is a block-structured language, like Pascal, which means that individual sections of code that are executed when certain conditions are met are set off from other sections very clearly, so that you can tell as you read the program exactly when each part of the program will run. It has the code constructs required for structured programming, a coding discipline that makes it easier to read and understand other programmers' work—or your own, six months later.

C was originally developed as a language for systems programming; it was intended to make assembly language unnecessary on mainframes.

C compilers are available on micros, minis, and mainframes. If you take care to use standard features of the language, your source code will compile and run correctly on your Kaypro 2 and on the biggest IBM.

A bit of history

C was originally developed at Bell Labs in the early 1970s as the language in which to write the Unix operating system. The operating system was designed

to run compatibly on incompatible hardware—that is, to let programs that worked on one Unix machine compile and run correctly on any other, so that programmers wouldn't have to waste their time solving the same problems over and over. (This mostly works, by the way. "Porting" an application program from one Unix machine to another may take hours, instead of the days or weeks it takes to move from one manufacturer's proprietary architecture to another.)

The operating system was originally written in assembly language, but when the Unix group wanted to make the operating system run on another vendor's machine, they needed a portable language that would still give the machine-level access required for efficient operation. Dennis Ritchie developed C, which was modeled on a language called B, which had been derived from an earlier language named BCPL.

The Bell Labs philosophy was that a good computer environment allowed you to create a set of software tools. This not only meant reusable subroutines that were available to each program; but a way to put small general-purpose programs together into systems.

In 1978, the first book on C was published. This was Brian Kernighan and Dennis Ritchie's *The C Programming Language* (Englewood Cliffs, New Jersey; Prentice-Hall, 1978), which defined the language formally and gave examples of its power and efficiency.

Bell licensed the Unix operating system very cheaply to universities, and through the 1970s a lot of computer science students used C. When they went to work, they wanted to keep on using the language, so demand for C compilers grew. Naturally this spilled over into the world of micros fairly quickly.

P. J. Plauger, who had collaborated with Brian Kernighan on a number of computer science books, founded a company named Whitesmith's, which sells, among other products, C compilers for a very wide range of machines running proprietary operating systems.

C on microcomputers

In 1980, *Dr. Dobbs' Journal* published a source listing for a C subset compiler called "Small-C." This compiler ran on the CP/M operating system, and it has been the basis for more than one CP/M C compiler.

By 1982, Leor Zolman of BDS software had created BDS C, a C subset compiler for CP/M optimized so that the compilation is itself very fast, as is the code the compiler produces. The compiler was popular enough to spawn the "C Users Group," which maintains an extensive library of public domain BDS C software and distributes inexpensive updates of the compiler.

"Small-C" has been expanded into two different compilers for CP/M systems: C/80 from the Software Toolworks and Q/C from The Code Works. Each of these excellent products has special virtues: Q/C not only has a Unix-compatible input/output (I/O) library, it comes with complete source code for the compiler, which allows adventurous programmers to extend the language themselves. C/80 is a real bargain; at \$49 it's a good enough language that several other Software Toolworks products were written using it.

*Because C is compiled,
while BASIC is inter-
preted, a C program
can run much faster.*

C is *the* implementation language on the IBM PC and compatibles. Digital Research, the people who came up with CP/M, created a C compiler and announced that they'd do all their programming work in C from then on. Ashton-Tate recoded dBASE II in C—it had been in assembly language—and wrote both dBASE III and FRAMEWORK in C. (This is why dBASE III could be ported to AT&T's Unix PC with so little effort.) Many other microcomputer software developers use C.

In short, C has come out of the laboratory. Professional programmers use it every day to solve real problems on micros, minis, and mainframes.

C vs. BASIC

Why is C a better language than BASIC for real-world programming? The answers are speed, modularity, convenient low-level access, and maintainability.

Because C is a compiled language, while most BASICs are interpreted, a C program runs much faster than a BASIC program. This makes C a better language for any application that must work fast, such as a word processor or a communications package.

C is modular. You can build a large program from many smaller reusable pieces, called functions. Once a function works, you can put it in a library and use it again in other programs. In BASIC, every line of code to be executed has to be typed into your program every

time. Subroutines have to know the names of the variables they're working on, so you can't write reusable general-purpose subroutines; you have to write and debug the same routines over and over again.

C gives you low-level access. You can do anything to bits or bytes that you can do in assembly language, and do it easily. This isn't true for BASIC.

C is more maintainable than BASIC. A large program in C is easier to read and understand than a large program in BASIC, and therefore easier to change. Because the big C program is made up of little ones, you have less code to understand at a time.

C is easier to understand because it's designed for structured programming, sometimes called "goto-less programming." The "goto" statement is considered poor form because it leads to so-called "spaghetti code," in which the flow of control in the program is so tangled that you can't tell what it's doing.

Finally, C programs are easier to maintain because C makes you declare variables before you use them. BASIC doesn't, which means that you can make a typo when referring to an existing variable, and BASIC happily creates a new variable for you, leaving the old one untouched. This can result in hours of frustration. C compilers will catch that mistake and give you an error message.

C vs. Turbo Pascal

Although Turbo Pascal, from Borland International, is a fine product at a good price, C is preferable for one major reason—modularity. While a Turbo Pascal program can be built up of small pieces, the source of each one of these must be brought into the program with the "include" statement. As a result, each small piece must be compiled anew each time. Large programs can take a long time to compile when the compiler has to redo the standard functions each time. C allows you to put standard functions into a library and bring the machine-language versions into your program using a linking loader, which most C packages include or support. It's a lot faster to link previously compiled code into your program than to recompile the same code each time you make a change in the program.

A walk through a C program

Listing 1, below, shows a C program that would be hard to write in BASIC. It counts the lines, words, and characters that will print in a WordStar document. WordStar has "dot commands" that control formatting, but do not print. These are lines that begin with a period and end with a carriage return. WC, the word count program that comes with the Kaypro, handles these incorrectly by including them as part of the word count. The program `wwc.c` (by convention, C programs are in lower case and their names end in ".c") avoids this problem.

The body of the program is based on a program in *Software Tools* by Brian Kernighan and P. J. Plauger,

the same program **WC** is based on. I've added the function **mygetc()**, which eliminates lines that begin with a period. This particular version was compiled with C/80 from The Software Toolworks.

```
/* wwc.c
   "C" version of wc from Software Tools
   modified to handle WordStar document files
*/
#include "printf.c"
#define TRUE 1
#define FALSE 0
#define EOF -1
#define ERROR 0

int ifd, l, c, nl, nw, nc, inword;

main(argc, argv)
char **argv;
{
    printf("\n\\n\\n\\t\\twwc: counts words in WordStar files");
    if (argc != 2)
    {
        printf("\nyou must enter the file name");
        printf("as part of the command line");
        exit();
    }
    ifd = fopen(argv[1], "r");
    if (ifd == ERROR)
    {
        printf("\ncannot open file");
        exit();
    }
    inword = FALSE;
    nl = nw = nc = 0;

    while ((c = mygetc()) != EOF)
    {
        ++nc;
        if (c == '\n')
            ++nl;
        if (c == '\n' || c == '`' || c == '\t')
            inword = FALSE;
        else if (inword == FALSE)
        {
            inword = TRUE;
            ++nw;
        }
    } /* ends the while */
    printf("\n in file %s there were", argv[1]);
    printf("\n%5d lines, %8d words, %11d characters\n", nl, nw, nc);
    fclose(ifd);
    exit();
} /* ends "main" */
```

LISTING 1 A program in C to count words in a WordStar file.

Let's take it from the top. Comments in C are like REMarks in BASIC; they have no effect on the way the program runs. In C, a comment begins with **"/"** and ends with **"*/"**. A comment can run for any number of lines, and everything in between the **"/"** and the **"*/"** is ignored by the compiler.

The commands beginning with a number sign (**"#"**) are **pre-processor** commands. Before the code is compiled, the pre-processor massages the text. The **#include** command tells the pre-processor to go out

and get a function called **"printf,"** which handles formatted output. In C/80 the function needs to be included if you aren't using a link-editor; in other C versions it's part of the standard library. The **#define** commands tell the pre-processor to replace the first thing (like **TRUE**) with the second thing (like **1**). The next line declares the variables **ifd**, **i**, **c**, **nl**, **nw**, **nc**, and ***inword** to be integers. In BASIC, you need only to **DIM** (dimension) your arrays, but in C you must declare every variable.

Execution of C programs always begins at **main**. The program **wwc.c** starts by identifying itself. The standard procedure **printf** writes the string that's in quotes out to the console. The **"\n"** is a **newline**, which amounts to a carriage return/linefeed pair. **"\t"** is a tab. So, we space down three lines, tab over twice to center the output in the screen, and then tell the user that **"wwc: counts words in WordStar files."**

The program expects you to type **"wwc filename,"** and if you type anything else it is an error. The **argc** and **argv** are two system-supplied values that relate to the command line. The value **argc** is a count of the arguments passed. The first argument, whose address is in **argv[0]**, is the name of the program. The value **argv[1]** contains the address of the second argument, which is the filename.

The **!** is the **"not"** operator in C. The test reads **"if argc is not equal to 2,"** which means that the user didn't type the filename, or typed something extra. The curly brace begins the block that's executed when the if test is true; if it is, **wwc** prints a diagnostic message and exits.

Otherwise, we open the file whose name was typed on the command line. The variable **ifd** receives a value that identifies the specific file just opened. If **ifd** is equal to **0**, which is the **ERROR** value, we couldn't open the file, so we print a diagnostic message and exit.

Since we were able to open the file, we initialize our variables next. The flag ***inword** is set to **FALSE**, and the counters **nl** (number of lines), **nw** (number of words), and **nc** (number of characters) are all set to **0**.

Now comes the real action in the program. The **while** loop—which should look somewhat familiar to BASIC programmers, who are used to **WHILE/WEND**—sets **c** equal to the value returned by the function **mygetc**, and tests the value to see whether end-of-file has been reached. The function **mygetc** returns one character at a time from the file. So long as end-of-file has not been reached, all the code between the curly braces is executed.

Since we know we have a character, we add to the character count. The command **++nc** is C shorthand for **nc = nc + 1**. Now we test to see whether the character is a **newline**. If it is, we know we hit the end of a line, so we add one to the line count. A double equals sign (**==**) is the comparison operator for equality in C.

In the next line, we want to find out if we're still in a word. If the character we got was a **newline**, a blank, or a **tab**, we know we're no longer in a word. A double bar

(||) is the **or** operator in C. The **else** clause applies when the **if** was false. We must be in a word. If we weren't in one already, we set **inword** to **TRUE**, then add one to the word count.

The next curly brace ends the **while** loop, so we reach the following code only after hitting the end of the file. We use **printf** to print the name of the file we've scanned, and then give the counts of lines, words, and characters.

Finally, we close our input file and exit.

Handling dot commands

You've probably noticed that nothing has been done to eliminate the dot commands. That's what **mygetc** does (see Listing 2, below). It begins with a comment describing the method of operation.

```
mygetc () [
/* Reads a character at a time; remembers the last character. If this
   is the first character of a line, and it is a ".", gobbles the line. */
auto int mychar;
static int prevc = '\n';

    if ((mychar = getc(ifd)) == EOF)
        return mychar;

    if (prevc != '\n')
    {
        prevc = mychar;
        return mychar;
    }

    if ((char) mychar != '.')
    {
        prevc = mychar;
        return mychar;
    }

    while ((mychar = getc(ifd)) != '\n');
    mychar = mygetc();
    return mychar;
}
```

LISTING 2 The "mygetc" function.

The declaration **auto int mychar** specifies **mychar** as an integer variable that will be allocated anew every time **mygetc** is called, and freed when **mygetc** returns. This means that the memory it takes up isn't being used when **mygetc** isn't running. Conversely, the declaration **static int prevc = '\n'** says that the value of **prevc** must be retained through every call of **mygetc**, and that it should initially contain a **newline**.

Now the work begins. The variable **mychar** is set equal to the value returned by **getc**. **getc** is a standard library function that reads one character at a time from the file opened in main, using **ifd**. If the character **getc** returns is EOF, the end-of-file character, **mygetc** returns the value of **mychar**, which is also EOF.

Now we want to look for a period at the beginning of a line. If **prevc** doesn't contain a **newline**, we know that we aren't at the beginning of a line. We set **prevc** equal to the current character, so that we'll know where we

stand the next time, and return the character we just read to the main program.

The variable **mychar** had to be declared as an integer so that we could compare it to EOF, which is a number. Now we'd like to treat it as a character so that we can compare it to a period. C allows us to force a temporary conversion of **mychar** into a character variable by saying **(char) mychar**, and we test to see whether the character returned is a period. If it isn't, we set **prevc** equal to the current character, and return to the main program.

Now **mygetc** gets interesting. We've found a line we want to read and throw away. The **while** has no body; it just reads, using **getc**, until it reaches the end of the line, which is where it finds a **newline**. Now we want to return the next character that begins a line and isn't a dot command. What if there were two dot commands in a row?

We could duplicate the code we just went through to find a suitable character to return, but that wouldn't solve the problem of three dot commands in a row. What we can do, though, is call a function which returns just the kind of character we want—**mygetc**!

The function **mygetc** will keep on calling itself until it either reaches the end-of-file or finds a line that isn't a dot command. Then it will return the first character of that line, and that will go all the way back to the main program. This example of a program calling itself is a very powerful technique called "recursion," which is impossible in languages like BASIC.

Want to know more?

If you like what I've told you about C and you want to find out more, there are a couple of books you may want to read. One of these is *The C Programming Language*, already mentioned. It isn't a very good tutorial; it's hard to learn the language from it. But it's very much worth reading when you already know some of the language; the examples, will show you why C is such a powerful language.

If you're learning the language from scratch, Bruce Hunter's *Understanding C* (Berkeley, California: Sybex, 1984) is good. The majority of his example programs are coded in BDS C and will run as they stand on the Kaypro. Hunter also explains the relationship between Unix and C as well as going into detail on libraries.

Go to it! You'll be impressed when you C what you can do with this language. □

Alan Winston, a freelance writer and full-time programmer/analyst, has been programming since the age of 12. He is an editor-at-large for Unix/World.

For a Quick Reference Summary of vendors of the C language, turn to page 46.

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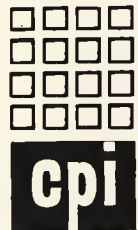
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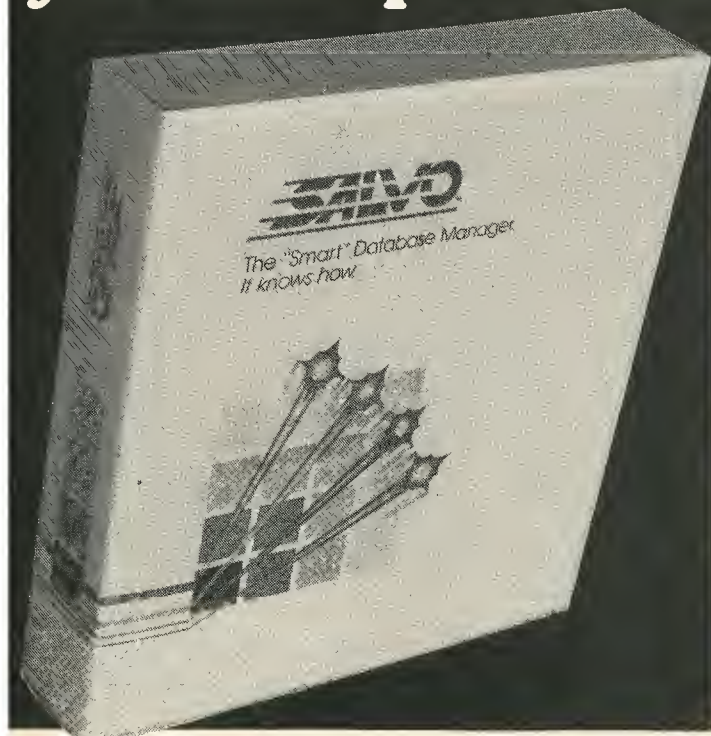
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CAN YOU C

(continued from page 42)

Quick Reference Summary

PRODUCT	VENDOR	PRICE
BDS C	BD Software, Inc. PO Box 2368 Cambridge, MA 02238 (617) 576-3828	\$150
C/80	The Software Toolworks 15233 Ventura Boulevard, Ste 1118 Sherman Oaks, CA 91403 (818) 986-4885	\$49
Q/C	The Code Works PO Box 62136 Santa Barbara, CA 93160 (805) 683-1585	\$95

BASIC TO TURBO

(continued from page 28)

generic BASIC and standard Pascal. They both proceed logically from the simple to the complex, from the familiar to the unfamiliar, building on the reader's presumed experience with BASIC. Each does a good job of leading the reader to a general understanding of Pascal. Choosing between them is mostly a matter of choosing between contrasting styles.

Peter Brown is a British university professor. His clear explanations and many short examples amply illustrate Pascal's features. But Brown offers more than a comparison of the bare mechanics of the two languages. He assesses their strengths and weaknesses with the help of a couple of fictional programmers. Bill Mudd is a hidebound BASIC programmer who is reluctant to admit that his favorite language may not be perfect. Professor Primple is a fanatical—and equally unyielding—Pascal proponent. Mudd's struggle to defend BASIC against Primple's relentless advocacy provides useful insights into good programming practice regardless of the language used.

Seiter and Weiss, on the other hand, have taken a much more businesslike approach to the subject. The writing style is straightforward and concise. While they also provide many short examples, they include more complete sample programs—and looking at whole programs is a good way of seeing how the many components of a Pascal program fit together. □

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Adding a Hard Disk

Speeding up your work with a subsystem

by Thomas Enright

Not all of us can afford to begin our association with computers by buying a hard-disk system like the Kaypro 10. Far more Kaypro owners start off with a Kaypro 2 or 4 (now called the 2X). For your initial contact with the powerful and sometimes frustrating world of personal computers, a floppy-based system is just fine. But sooner or later all of us start yearning for the speed and convenience of a Winchester hard disk.

What we'll be discussing in this article are hard-disk subsystems for your Kaypro 2 or 4. Hard-disk subsystems include everything you'll need to interface to your computer, all in one package. But before you can run out and buy one, you'll need to make some decisions—decisions about whether you really need a hard disk, what size hard disk you need, who to buy it from, and how to get it up and running with your computer.

Considering the advantages

Speed and convenience—that's the bottom line with a hard disk. The seemingly interminable wait while reading or writing to disk on a floppy-based system is reduced by approximately 75 percent. Anyone who uses a computer can appreciate this kind of time savings.

Along with faster operation comes the convenience of having your entire software library immediately available. No more searching through piles of disks to find your word processing or BASIC programming disk.

The business user gets an additional bonus from upgrading to a hard-disk system. Several very comprehensive accounting and inventory management packages will not run on floppy-based systems. They need the capacity and speed of a hard disk.

Determining your needs

One of the first decisions you'll have to make when you consider adding a hard disk to your Kaypro—or any other computer—is how much storage to add. Hard-

disk subsystems are available with storage capacities ranging from five megabytes to well over 100 megabytes. In making this decision you'll have to strike a happy medium between your needs (or desires), available features, and your wallet.

The businessman who uses his computer for accounting or other professional uses has an easier job of estimating to do. The first step is to add up the storage needed for programs already in use. Then do some research on what programs you think will be needed in the future and how much disk space they require. Add both these figures together, then multiply by two, and you should be fairly safe.

Writers have a more difficult decision to make. Almost everything a writer does with a computer is disk intensive. Word processors, spelling checkers, and indexing programs all do a lot of disk I/O. On the other hand, a hard disk won't make you a better writer—it will just let you manipulate the data faster. Convenience plays a major role in how much a writer needs a hard-disk subsystem.

Given the cost of such subsystems, you may do well to consider other alternatives. Replacement monitor ROMs that support up to four quad-density floppy drives are available from Micro Cornucopia and Advent Products. This means you can have a system with up to four 740K floppy drives. Their storage capacity is less than that of a hard disk, and I/O speed is slower, but they cost less.

System configuration

Once you've decided that you absolutely must have a hard disk and have figured out how big it needs to be, you can look at how to configure the storage. As mentioned earlier, hard-disk subsystems have from five to more than 100 megabytes of storage. You can also buy hard-disk subsystems with a combination of fixed disks and removable cartridges, or with a tape drive to back up the hard disk.

Cartridge drives were originally intended to serve as

the backup facility for fixed disks. It would take a whole pile of floppy disks to back up a 20-megabyte hard disk, but the same job would only require two 10-megabyte cartridges. When the cartridge drive isn't being used for backup, there's that much more online storage for the system. Cartridge drives can even be installed by themselves so you can have the best of two worlds—replaceable media combined with hard-disk speed.

With a cartridge drive you can get along with a lot less total storage capacity. You can get the equivalent of several Kaypro 10s by setting up a different cartridge for each major task area. And you'll gain the security of being able to remove sensitive data from the machine and lock it up.

Choosing a vendor

When you've figured out just what your needs are in a hard-disk subsystem, you can start thinking about which vendor to buy it from. The list of vendors will be narrowed somewhat by your needs; not all subsystems offer the same features. Other factors to take into account are availability, support, and options offered at extra cost by each vendor.

*When you've figured out,
what your needs are, you
can think about which
vendor to buy from.*

In considering availability, you must take into account where the vendor is located, whether shipping is included in the price, and whether the subsystem is ready to be shipped immediately. If the vendor is located fairly close to you, shipping costs will be lower, and the chances of damage in transit are reduced. Always be sure the equipment you're buying is really available. You don't want to spend two or three thousand dollars to finance development of the drive you thought you were buying.

When you're spending this much money it's not out of line to ask the vendor or dealer for references. This is a fairly common practice when dealing in expensive equipment. The vendor who refuses to provide this information may not be trying to hide anything; he may only be protecting the privacy of his customers. However, the vendor or dealer who is prepared with a list of references makes a much better impression on prospective customers. Dealers may not like this idea, but they won't have too much choice if customers start insisting upon references. Talking to previous customers also gives you an idea of what kind of customer support the vendor or dealer is willing to provide.

Product support is an important item on your list of things to check. The biggest and fastest hard disk on the market doesn't do you any good when you can't

make it work. Customer support deserves considerably more weight than price when you're shopping for this kind of equipment. Almost everyone has had the experience of buying the cheaper of two items and regretting it later. You'll have too much invested in the data on your hard disk to make the purchase decision based on price alone.

Acquiring the drive

By this point in the procedure you will have pretty well decided which drive you're going to buy. The next step is to figure out whether to buy it directly from the vendor or through a dealer in your area.

Whether you buy from a dealer or the vendor can affect the quantity and quality of customer support you get. A local dealer is easier to get in touch with when something goes wrong than a vendor three states away. Besides, you represent repeat business to a dealer, and repeat customers get better service.

Your own technical skills will also have a bearing on who you buy a hard-disk subsystem from. Technically erudite users don't need as much support to get the system up and running. They are also more likely to be satisfied with only telephone support from a distant vendor than someone who isn't as technically inclined.

If you aren't sure which category you fit in, don't be afraid to ask for advice. Ask people at your local users' group, or post some questions on a couple of local BBSs. Businessmen should consider hiring consultants to configure their systems for them. As teachers are fond of saying, "The only dumb question is the one that isn't asked."

Installation

Now that you have finally purchased the little beast, who's going to install it? If you're leery of poking around inside the computer, you should buy the subsystem through a dealer and have him do the installation. If a dealer installs the subsystem for you, be certain that you know in advance how much the installation will cost. Having the dealer install the subsystem is by far the easiest way to get your system up and running.

For the do-it-yourself purchaser, there is a little more thought and planning involved. How easy it is to install the subsystem depends on just what kind of hard disk you buy. With an external subsystem, the hardware installation is much simpler. The external system already has its own cabinet and power supply. The only things that have to be installed inside your computer are the interface board and data cable.

The most common method of interfacing your CP/M Kaypro with the hard disk is with a "piggyback" interface board. Installing the board consists of removing the Z80 CPU from its socket, installing the Z80 on the piggyback board, and then plugging the board into the Z80 socket. One end of the data cable plugs into the interface board and the other end into the hard disk chassis.

Table of Hard-disk Subsystems

Vendor	Model	Size	Drive Type	Kaypro 8 Bit	Kaypro 16 Bit	Price	Remarks		
API		10M	Internal Fixed	2/4	No	\$ 1075	All subsystems include Advents TurboROM upgrade.		
		20M	Internal Fixed	2/4	No	1506			
		32M	Internal Fixed	2/4	No	1639			
							Call for pricing on Kaypro 10 and external systems.		
SPC #	5C	5.4M	External Fixed	Yes	Yes	995	Bare subsystem chassis and power supply - 150.00		
	5RI	5.4M	Internal Cartridge	Yes	Yes	1495			
	10I	10.8M	Internal Fixed	Yes	Yes	1295	ZCPR3 - 149.00		
	10RI	10.8M	Internal Cartridge	Yes	Yes	1995			
	26I	26.7M	Internal Fixed	Yes	Yes	1995	Other drive combinations on special order.		
	40I	40.0M	Internal Fixed	Yes	Yes	2695			
	Diskit Combo	10.8M	External Fixed						
		5.4M	External Cartridge	Yes	Yes	2740			
	Remedy Combo	10.8M	External Fixed						
		10.8M	External Cartridge	Yes	Yes	2995			
	Ultrastore 70	70.0M	External Fixed						
		10.8M	External Cartridge	Yes	Yes	3995			
	Ultrastore 140	140M	External Fixed						
		10.8M	External Cartridge	Yes	Yes	4995			
TIS #		10M	External Fixed	Yes	*	1695	*Call for special pricing on 16 bit and Kaypro 10 subsystems.		
		10M	Internal Fixed	Yes	*	1195			
		21M	External Fixed	Yes	*	3295			
		21M	Internal Fixed	Yes	*	2850			
		42M	External Fixed	Yes	*	4750			
		42M	Internal Fixed	Yes	*	4195			
		70M	External Fixed	Yes	*	5995			
		70M	Internal Fixed	Yes	*	5495			
		120M	External Fixed	Yes	*	10495			
	Backup Kits:	10.8M	Cartridge	Yes	*	2195			
		20-60M	Tape Drive	Yes	*	1995			
	WC		11M	External Fixed	Yes	*		1295	*Call for pricing on 16 bit subsystems.
			23M	External Fixed	Yes	*		1795	
		35M	External Fixed	Yes	*	2395			
		47M	External Fixed	Yes	*	2995	All subsystems include a menu management program and SuperCalc2 spreadsheet.		
		5M	Add on Cartridge Drive			1295			
		5M	Cartridge Media			125			
WEB		Small area networking subsystem. Networks 4 computers with 5, 10, or 15 megabyte hard-disk. Can be Interfaced with other Westwind hard-disk subsystems. Call for prices.							

Also offers complete systems with internal drives already installed.

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(800) 521-7182 - other states

SPC - Systems Peripheral Consultants
9747 Business Park Ave.
San Diego, CA 92131
(619) 693-8611

WC - WestWind Computer
1690 65th St.
Emeryville, CA 94608
(415) 652-3222

TIS - Technology Information Systems
3621 N. Central
Phoenix, AZ 85012
(800) 821-1989 Ext. 448

Internal systems, which are mounted inside the existing chassis, take more skill to install than external ones. The internal hard disk will replace your B drive, so that drive has to be removed. (The standard power supply isn't heavy-duty enough to allow two floppy drives and a hard disk.) Then the data cable from the piggyback interface board is connected to the new drive. Power for the hard disk is taken from the same connector that went to the drive you removed.

The major impact of an internally installed hard disk subsystem is its affect on the transportability of your computer. Hard disks are more susceptible to damage from being jolted during transport than a floppy disk drive. Since the media cannot be removed from a hard disk, unless you have a cartridge drive, you always run some risk of damaging the disk during transport. Adding an internal hard disk also makes the computer several pounds heavier.

With an external hard disk you can disconnect the hard disk subsystem and take the basic computer wherever you need to go. That's real flexibility in both worlds, a hard disk system at the office and a floppy disk system when you need to get some work done in the field. With that kind of efficiency your investment can amortize itself even faster.

System software

Once the hardware is in place, it's time to install the system software. A hard disk, like a floppy diskette, has to be formatted before it can be used. Unlike a floppy diskette, a hard disk also has to be partitioned into

instructions.

Working with a hard disk

Now that everything is installed, you can start loading your working software. On hard-disk systems you can take advantage of all 15 user areas provided by CP/M to arrange your programs into logical groups. You can group utility programs in user area 0, word processing programs into user area 1, and so on. If you group all your programs in user areas according to their uses, it makes them easier to find later.

User areas on a CP/M disk are logical separations, not physical ones. Each user area takes as much space from the total available storage as it needs. This is because the only thing that separates a file in user area 1 from a file in user area 15 is one byte in the directory entry. The directory entry, on disk, uses the first byte to indicate what user area the file belongs to.

One characteristic of Kaypro '84 series CP/M computers is that user area 0 is public to the rest of the disk. Utility programs or any other programs in user area 0 can be run from another user area by just typing the program's name. If you're in user area 4 and type the name of a program, Kaypro's version of CP/M looks for that program in user area 0 if it can't find the program in the current user area. That's why most Kaypro 10 owners group their utilities in user area 0 and the rest of their programs in other user areas.

Another characteristic of CP/M user areas is that when an application program in one user area opens a file on another drive, that file is opened in the same user area on the other drive. This makes it even easier to segregate your applications by user area. That's the idea of this entire exercise—to make using your computer easier and faster.

Conclusions

By now you've acquired an idea of what is entailed in adding a hard-disk subsystem to your Kaypro. You've learned just what the advantages of a hard disk are, how to estimate your needs, what kind of subsystems are available, how to go about choosing one, and what is involved in installing it. The major point is that since these subsystems aren't cheap, you need to do some careful estimating and planning before you run out and buy one.

Accompanying this article is a chart of vendors who sell Kaypro-compatible hard-disk subsystems. Studying the chart will give you a start on picking out the hard-disk subsystem that will do the job for you.

This chart is based on information supplied by vendors. Time does not allow us to verify the suitability or performance of subsystems included in this chart. Please verify prices and model suitability before ordering any hard-disk subsystem. If possible, it would be highly advisable to see a demonstration of the subsystem you want running on a Kaypro before you spend your money. □

How much user input is required during installation varies among vendors.

logical drives before you can use it.

The need to partition hard disks derives from CP/M's limit of eight megabytes per drive. Since CP/M 2.2 cannot normally access a drive larger than eight megabytes, the installation software convinces CP/M that there are several smaller drives instead of one big one. A ten-megabyte hard disk is usually divided into two five-megabyte sections. Creating this little piece of programming hocus-pocus is up to the vendor.

All you have to do is run the program that the vendor provides. How much user input is required during the installation process varies among vendors. Some setup programs allow no variations—drives are partitioned the way the vendor wants. Others allow variations, but may require programming skill to implement them. Even the ones that allow customization have default values. Just enter the values given in the installation

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DU to the Rescue

Part 2: More microsurgery to save crashed disks

by Ted Silveira

If you followed last month's article, you may feel that you weren't on a guided tour so much as a jungle safari . . . with a guide who'd sneaked off, taking the maps with him. Never fear. This month we'll hack our way back out of the jungle, carrying our trophies.

If you aren't comfortable with any of the material covered so far, review last month's installment before you go on. When you're ready, put your Utility Disk in drive A and your Test Disk in drive B, run DU, and display the first sector of the disk directory on your Test Disk. You should see a display similar to that in Listing 1, which shows the first sector of the directory in my Test Disk.

Changing bytes in hexadecimal

Last month, I quickly showed how to use DU's CH command to erase or unerase a file. Here it is in more depth.

To change any hexadecimal value in your current sector, use the command **CHxx,nn**, where **xx** is the location (from 00 to 7F) of the byte you want to change and **nn** is the new value to insert. The command **CH00,E5** will Change the Hexadecimal value at location 00 to E5h. DU won't show the changes made until you redisplay the sector with the D command.

To make the change permanent, enter **W** at the DU command prompt so that DU will Write the altered sector to the disk. Otherwise, your change will be lost when you leave the current sector.

Erasing and Unerasing Files. To erase a file, change its user code to E5h. Because MONSTER in Listing 1 has two directory entries, you'd need two commands, **CH40,E5** and **CH60,E5**, to change the user codes at both location 40 and location 60.

To unerase a file, change its user code from E5h to 00h. To unerase MONSTER, you would give two commands—**CH40,00** and **CH60,00**—one at a time.

Try it yourself. Erase some files on your Test Disk by changing their user codes from 00h to E5h. Write these changes to the disk, exit DU, and use DIR to make sure the files are gone. Then run DU again and unerase

them.

Moving a File to a New User Area. Now, using DU on your Test Disk, change the user code of an active file to 01h. Exit to CP/M and enter **DIR B:**—the file won't show.

Staying in CP/M, move to drive B, and at the B> prompt, enter **USER 1**. Then enter **DIR**—your missing file will show but your other files will not. Enter **USER 0**, and then **DIR** again—the altered file won't show and the others will.

You moved the file to a new *user area* by changing its user code. You can place files in any of 16 user areas (numbered 0 to 15, with 0 being the default user area), but you can only see those files that are in the same user area you are.

User areas aren't too useful on floppy disks, but they're very helpful for organizing files on a hard disk.

Changing Several Bytes at Once. You can change several sequential bytes with the single command **CHxx,nn,nn,nn**, where **xx** is the starting location and **nn,nn,nn** is a string of hexadecimal values (as many as 40) to be inserted.

Changing bytes in ASCII

You can also make changes in ASCII using the CA (Change ASCII) command, **CAxx,c**, where **xx** is the location to be changed and **c** is the ASCII character to

LISTING 1

Typical DU display, showing the first sector of the disk directory on my Test Disk.

G=00:00, T=1, S=1, PS=0

```
:D
00 00464C4D 4B543030 31545854 0000005B *..FLMKT001TXT...[*
10 02030405 06070000 00000000 00000000 *.....[*
20 E542494F 20202020 20545854 00000003 *eBIO      TXT....*
30 00000000 00000000 00000000 00000000 *.....[*
40 004D4F4E 53544552 20202020 01000080 *.MONSTER .....*
50 090A0B0C 0D0E0F10 1112191A 1B1C1D1E *.....[*
60 004D4F4E 53544552 20202020 03000003 *.MONSTER .....*
70 1F28292A 2B2C2D2E 2F000000 00000000 *.() *+,-./.....*
```



insert. In Listing 1, to change FLMKT001.TXT to FLMKT001.DOC, you would give DU three commands: **CA09,D** (Change the ASCII character at location 09 to D), **CA0A,0**, and **CA0B,C**.

You can enter a string using the command **CA-xx,cccc**, where **xx** is the first location to be changed and **cccc** is a string of ASCII characters (up to 120) to be inserted. So, you could change FLMKT001.TXT to FLMKT001.DOC with the command **CA09,DOC**.

Searching for a string of bytes

You can search the entire disk for any string of ASCII characters or hexadecimal numbers by using the "=" command. To search for an ASCII string, use the command **=Cccc**, where **Cccc** is any string of ASCII characters. This search distinguishes between upper and lowercase letters, so the command **=Warm** won't locate **warm**.

To search for a hexadecimal string, use the command **=<nn><nn><nn><nn>**, where **<nn>** is a hexadecimal number (**nn**) enclosed in angled brackets (**<>**). You can also combine hexadecimal numbers with ASCII; the command **=warm<0D><0A>** will search for **warm** followed by a carriage return (0Dh) and linefeed (0Ah).

If DU hasn't found your string by the time it reaches the last track on the disk, it will start over at the first track unless you abort. The search is slow, but don't let it go on forever.

Modifying the Warm Boot Message. Move to track 0, sector 1, of your Test Disk and enter the command **=Warm Boot**. DU will search until it finds the sector containing this phrase, somewhere on track 1.

This sector should look something like Listing 2 (below). The ASCII display is jumbled because this sector holds part of CP/M (most of CP/M is on track 0, but some is here on track 1). Most of the bytes are instructions to your computer, which only coincidentally have the same hexadecimal values as ASCII characters.

LISTING 2

DU display showing sector located by search for "Warm Boot" message.

T=0, S=1, PS=0

: =Warm Boot
= AT 55

G=01:07, T=1, S=24, PS=23

: D

```
00 F4320000 22010021 06E63205 00220600 *t2...!.f2...
10 21F3F622 93E12111 F722D8DE 2157F722 *!sv".a!w"X~lWw"
20 EAE43A04 004FE60F FE03DA00 DE79E6F0 *jd:..Of...Z..yfp*
30 4FC300DE 3AA9F4FE 00C47FF6 0E00CD94 *OC.~:}t..D.v..M.*
40 F6CD90F6 CD8CF6CD E7F60D0A 5761726D *vM.vM.vMgv..Warm*
50 20426F6F 740D0A00 31000101 0000CD98 *8oot...1....M.*
60 F60100DE ED4378F7 CDA0F601 012CC5CD *v...mC[wM v...EM*
70 9CF6CDA4 F6C18720 DFC52A78 F7118000 *.vM$VA7 _E*[w...
```

In the ASCII display, you'll see the words "Warm Boot"—the message you get whenever you enter ^C at the CP/M prompt. You can change this message as long as you use only these nine bytes—any more will wipe out part of CP/M. In Listing 2, you could change the message to "Okay Boss" with the command **CA-4C,Okay Boss**.

Change the "Warm Boot" message on your own Test Disk, exit DU, put your Test Disk in your A drive, and hit the reset button. Your new message will appear whenever you hit ^C.

Before continuing, put your Test Disk back in drive B, your Utility Disk in drive A, and enter ^C.

Examining a text file on the disk

To find out what a healthy text file looks like, display a few sectors of any text file on your Test Disk.

Listing 3 (below) shows the last sector of FLMKT001.TXT, a WordStar file from my Test Disk. In this sector, notice the letter "t" in "snapshot" (location 0D). Its corresponding value in the hexadecimal display should be 74h according to your ASCII table, but instead, it's F4h. Why?

As I mentioned last month, standard ASCII characters use only seven of a byte's eight bits, but WordStar sometimes sets the eighth bit to 1 for its own purposes—to mark the end of a word, for example. In this case, WordStar changed the "t" in "snapshot" from its normal 74h (01110100 in binary) to F4h (11110100 in binary), and it made a similar change at the end of most words in Listing 3.

LISTING 3

Final sector of FLMKT001.TXT from my Test Disk, as shown by DU.

G=07:0A, T=4, S=3, PS=2

```
00 696EF420 E120736E 61707368 6FF4208D *int a snapshot-.
10 0A6FE620 796F75F2 20736372 6565EE20 *.of your screen *
20 7768696C E5206564 6974696E 67AC2061 *.while editing, a
30 6EE4208D 0A64EF20 736F6DE5 206F7468 *.nd ..do some oth
40 65F22066 616E63F9 20747269 6368732E *.er fancy tricks.*
50 1A1A1A1A 1A1A1A1A 1A1A1A1A 1A1A1A1A *.....
60 1A1A1A1A 1A1A1A1A 1A1A1A1A 1A1A1A1A *.....
70 1A1A1A1A 1A1A1A1A 1A1A1A1A 1A1A1A1A *.....
```

You'll also see (at locations 0F-10 and 33-34) the combination 8Dh 0Ah. 0Ah is a linefeed, which usually follows a carriage return. But a normal carriage return is 0Dh, so what's 8Dh? 8Dh is a carriage return with the eighth bit set to 1—WordStar's "soft" carriage return.

Because Listing 3 shows the very last sector of FLMKT001.TXT, you can see that the file's last word ("tricks.") is followed by 1Ah, the end-of-file marker for CP/M text files. On a well-used disk, you may find part of a previous, overwritten file in the sector following the 1Ah end-of-file marker, but because your word processor stops at the end-of-file marker, you don't see such fragments when you're working.

If you use a word processor other than WordStar,

check your text file to see what (if any) special characters your program inserts.

To see how a healthy text file looks, display a few sectors on your Test Disk.

Examining other files on the disk

Examine some other kinds of files to see how they're put together—how the fields and records are marked in a database file, how rows, columns, and formulas are stored in a spreadsheet file—in case you ever need to repair one.

If you examine a program, you'll find it contains no meaningful ASCII strings, except for menus and error messages. You'll also find that programs don't use an explicit end-of-file marker like 1Ah; in fact, 1Ah may appear anywhere in a program as an instruction or a value.

Transplanting sectors on a disk—version 1

DU can also move sectors from one place to another. You

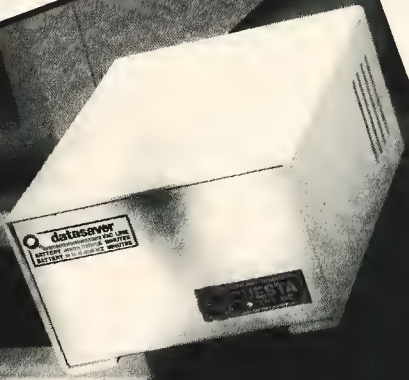
can even copy an entire file—it's good practice, so let's do it. Select a small file (covering at least two groups) from your Test Disk, and note its group numbers.

Mapping the Disk to Find Free Space. To transplant a file, you need a place to put it, so at the DU prompt, enter **M** to Map your Test Disk. DU will show you the map—a two-column list giving the group numbers covered by each file, the user code, the filename and filetype, and the logical extent. The map is ordered by group numbers, so a file will show up more than once if its groups are scattered around the disk. This map also shows erased files still in the directory even though an erased file's groups may already have been assigned to some active file. If two files claim the same groups, DU marks the files with an asterisk. You can eliminate the erased files from the display by a single left parentheses (at the command prompt, and then entering **M** again; now the map will show only active files.

Using the map, find enough free groups to hold the file you're going to copy.

Moving Sectors One at a Time. Move to the first sector of the file you're going to transplant, and enter **<** at the command prompt. DU will "pick up" the sector.

Now move to the first sector of the first group you've selected to receive the file, and enter **>** at the command prompt. DU will "put down" its cargo. Enter **W** to



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write the transplanted sector to the disk.

Now move the second sector, the third, and so on,

*Check your work, then
write changes to the
disk. If all goes well,
congratulate yourself.*

until you've transplanted the first group. Then move on to the next group, and repeat until you've transferred the whole file.

Creating a Directory Entry. Now you need a directory entry for the new file. Find a blank entry (all bytes set to E5h) or an erased entry in the disk directory, and then build the new entry as follows:

For the first byte, the user code, enter 00h to mark the file active.

For the second through ninth bytes, enter the new filename, using uppercase letters only. If the filename is less than eight characters, use spaces (20h) to fill out the length.

For the 10th through 12th bytes, enter the filetype. If it's less than three characters, fill it out with spaces.

Skip the 13th through 16th bytes, and move to the second line of the directory entry. Enter the group numbers used by the new file—first group in the first slot, and so on. Set all unused locations on this line to 00h.

Now return to the 13th byte of the first line—the logical extent count. Enter the number of the highest logical extent used *in this directory entry*. A logical extent is 16K, so if your file isn't over 16K, you're still in logical extent 0 (the first extent); enter 00h for the 13th byte. If your file is larger than 16K, you're into logical extent 01 (the second extent) or more.

The 14th and 15th bytes are for CP/M's housekeeping; set both to 00h.

The 16th byte is the record count. Enter the number of sectors (in hexadecimal) used in the highest logical extent in this directory entry—never more than 80h, the number of sectors in one logical extent.

Check your work, and then write these changes to the disk. Exit to CP/M, use DIR to see if your new file shows up, and then use CP/M's TYPE command to view it. If all goes well, take a moment to congratulate yourself.

Moving Sectors to Another Disk. You can also move a file to another disk—from drive B to drive A, for example. Pick up the sector from drive B, log in disk A (using the L command), deposit the sector, write it to disk, return to B, and repeat. You can even swap disks if you want to: just insert the new disk, enter N to tell DU you have a New disk, and proceed as before.

Using Multiple and Repeating Commands. You can

enter several DU commands at once by separating them with semicolons (;), so the command +;D, for example, will move you forward one sector and display the new sector. You can also repeat commands by adding the command /n where n is the number of times (in decimal) to repeat. So the command +;D;/16 will display the next 16 sectors.

WARNING: Don't use repeats with any command that writes changes to your disk. One small mistake and you can scramble a disk, even a hard disk.

Transplanting sectors on a disk—version 2

Copying a whole file using the < and > commands is tiresome, but fortunately DU gives you another option.

Choose another file to transplant and move to its first sector. Enter Y at the DU prompt to Yank the sector into your computer's memory. Move to the next sector, and yank it into memory also; DU will line it up behind the first sector. Repeat until you've captured the whole file (up to a limit of 40K), group by group.

Now, write the whole file to the disk using the K command, **Kd:filename.typ**, where d: is the drive designator and filename.typ is the name for your new file. For example, **KB:RESCUED.TXT** will save the file to drive B under the name RESCUED.TXT.

With the K command, you can't specify which groups your new file will occupy; DU will use the first available groups, overwriting any erased file that gets in the way.

DU-V88 has one bug in the K command. Under certain conditions, it won't write your new file if you don't specify a drive or if you specify a drive other than the current drive. To avoid this bug, always specify a drive with the filename, and if you want to save the file to a different drive, be sure to log in that drive *before* giving the K command.

*For times when you do
reach for DU, here are
some common problems
and their solutions.*

Other Commands. DU has more commands I haven't mentioned and variations on the commands I have mentioned. You can explore these by reading the help screens and the DU-V88.DOC file and by experimenting on your Test Disk.

Recovering from disk disasters

If it will take half an hour to recover a text file but only ten minutes to update the backup of that text file, don't bother with DU. For those times when you do reach for DU, here are some of the more common problems and their solutions.

If the problem is with a file

If a program gets damaged, you can't do much except get a fresh copy of the program, so mostly you'll be concerned with data files. Text files are the easiest to deal with, but you can also work with database and spreadsheet files, if you know how they're put together.

File Accidentally Erased. Change the file's user code from E5h to 00h. If CP/M hasn't written anything to that disk since the file was erased, it will all reappear.

However, if CP/M has written anything to that disk—because you copied or edited a file, for example—then your erased file or its directory entry (or both) may have been overwritten. When a file's user code is changed to E5h, its allocation groups go into the "free" pile. The next time CP/M writes to that disk, it uses the lowest-numbered free groups, overwriting whatever was there before. The same is also true of directory entries—when CP/M writes a new directory entry, it uses the first free entry space.

File Overwritten. If you think your file has been partly overwritten but its directory entry hasn't, find out which groups the affected file occupied and check to see if any of those groups has been assigned to another file.

If all the groups in your erased file have been assigned to another file, your file has been completely overwritten—it's gone.

If a text file has been only partly overwritten, salvage the remaining groups either by transplanting them to a new file or by rewriting the file's directory entry to include only these groups.

Directory Entry Overwritten. If a file's directory entry has been overwritten, you can only rebuild the entry by ferreting out the groups the file is stored in. Scan all the open groups, looking for your file or parts of it. If you do find part or all of your lost file, build a new directory entry containing the salvaged groups.

Premature End-of-File. STAT.COM says that your text file is 16K, but when you review it with your word processor, the text stops abruptly in the middle.

This problem is usually caused by a stray 1Ah byte (the CP/M end-of-file marker) buried in the file. Use DU to scan the sectors near the break-off point, looking for the 1Ah. Change it to a space or asterisk, and remove any other garbage. Then check to make sure you can read the file to the end.

Garbage in File. If your text file is readable but has garbage in it, you probably don't need DU at all. Use your word processor to remove the garbage, and, if you can, patch in the necessary parts from a backup file.

File Can't Be Opened—Bad Directory Entry. If you can't open a file that shows on your disk directory, check the directory entry first:

- The filename and filetype should contain only uppercase ASCII characters and spaces (20h). If a short filename is filled out with 00h instead of 20h, for example, you won't be able to open it.

- One of the file's active directory entries must contain logical extent 00 (or 00 and 01). If the directory entry containing extent 00 is marked erased, you can't open the file, even if it has other active directory entries.

- The file's group numbers must all be valid. A nonexistent group number (like FFh) will cause a drive error.

File Can't Be Opened—Bad Sector. If you have a bad sector in a file, you'll get the message "Bdos Err On B: Bad Sector."

First locate the bad sector or sectors. Using DU, scan the groups containing the affected file, sector by sector. You'll know when you hit a bad sector—either you'll see garbage in the ASCII display or DU will balk and say "READ ERROR."

Display the bad sector. If you see garbage, clean it out by changing all bytes in the sector to some harmless ASCII character, like an asterisk. If you don't get a "WRITE ERROR" message when you write these changes to the disk, you've probably fixed this sector. If you can move to a different part of the disk and then return to the bad sector without a read error, you're okay. Check the rest of the file for bad sectors.

If, when you display the sector, you see all E5h except for FFh in location 00, or if, when you try to rewrite the sector, you get a write error, then you may have damage to the disk formatting marks or to the surface of the disk itself. Because one bad sector can make a whole group unreadable, you'll have to transplant any good sectors from the affected group to a new group, using < and >. You'll be short one or more sectors in the new group, so fill the extra sectors with asterisks. Alter the file's directory entry, replacing the old group number with the new one, and then check for more bad sectors.

Once your file is readable, copy all files off that disk onto a clean one. Use PIP.COM, because COPY.COM will try to copy every sector, including the bad ones. Then try reformatting the bad disk. If it still won't format properly, discard it.

If the problem is with a disk

Disk Directory Display is Messed Up. If DIR or D.COM shows a display that's badly formatted or full of garbage, the disk directory is damaged. Scan all the directory sectors, including empty ones. You'll probably find garbage in one or more sectors; if not, make sure each entry is valid (see *File Can't Be Opened—Bad Directory Entry*).

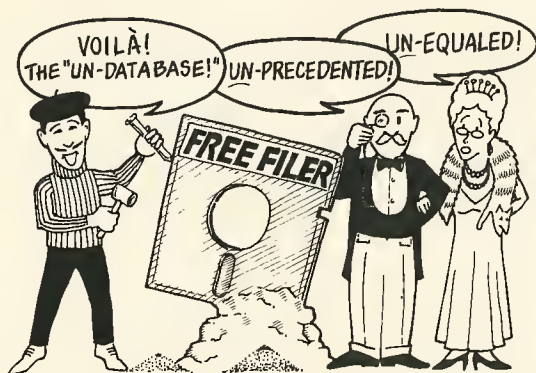
If you find a sector or an active entry full of garbage, set all its bytes to E5h. If you find an active entry that's only partly damaged, take a closer look. You can repair any damage to the first 16 bytes, but to repair damage to the second 16 bytes, the storage map, you'll have to search out the missing group numbers.

CP/M Won't Accept Disk. If CP/M refuses to read your disk, even in the B drive, it may indicate a damaged disk directory. Try logging in the disk using DU's L

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DU

command. Often, DU can muscle its way through, though it may pause and flash a "READ ERROR" message.

If DU can log in the disk, scan the disk directory for garbage and faulty entries (as above) and clean out anything abnormal. Sometimes that's all it takes.

*I've used this trick
to recover a couple
of disks I thought
were goners.*

If the disk directory is normal, or cleaning it up doesn't help, scan the disk for bad sectors. Use the command **D;+;/**, which will display the current sector and move to the next, repeating until you abort with **^C** or hit a bad sector and get a read error. Clean up the bad sectors if you can, and try the disk again.

If the disk is still damaged, transplant the files to another disk.

DU Won't Accept Disk. Sometimes a disk is so thoroughly trashed that even DU won't log it in. If so, get a newly formatted disk in the same format as your damaged disk. Make sure the disk has nothing on it, not even CP/M. Insert this disk in drive B, log it in with DU's **L** command, and move to track 0, sector 1. Now, remove the blank disk and insert the damaged one *without* logging it in. Move somewhere else on the disk, and try to read a sector. If DU reads the sector, move to the disk directory and look for trouble, though you'll often find you can't fix this problem. If you can't, transplant the files to a new disk.

If this trick doesn't work the first time, try it once more. This time, after you log in the blank disk, move to sector 1 of its last track (track 39 for Kaypro 2, track 79 for Kaypro 4), and then change disks as before.

I've used this trick to recover a couple of disks I thought were goners, but when it doesn't work, it's time to give up or call a wizard.

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Ted Silveira is a freelance writer and editor and has taught writing at San Francisco State University. He is also a consultant for novice CP/M users and software librarian of a CP/M users' group.

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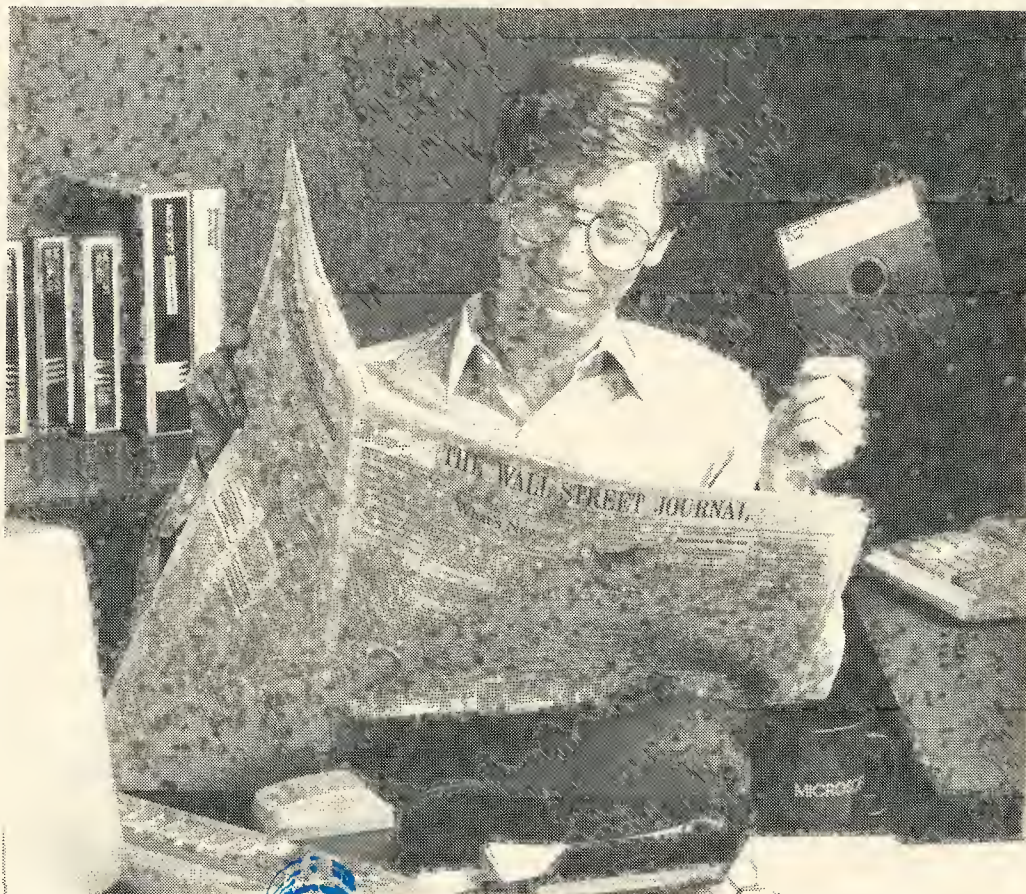
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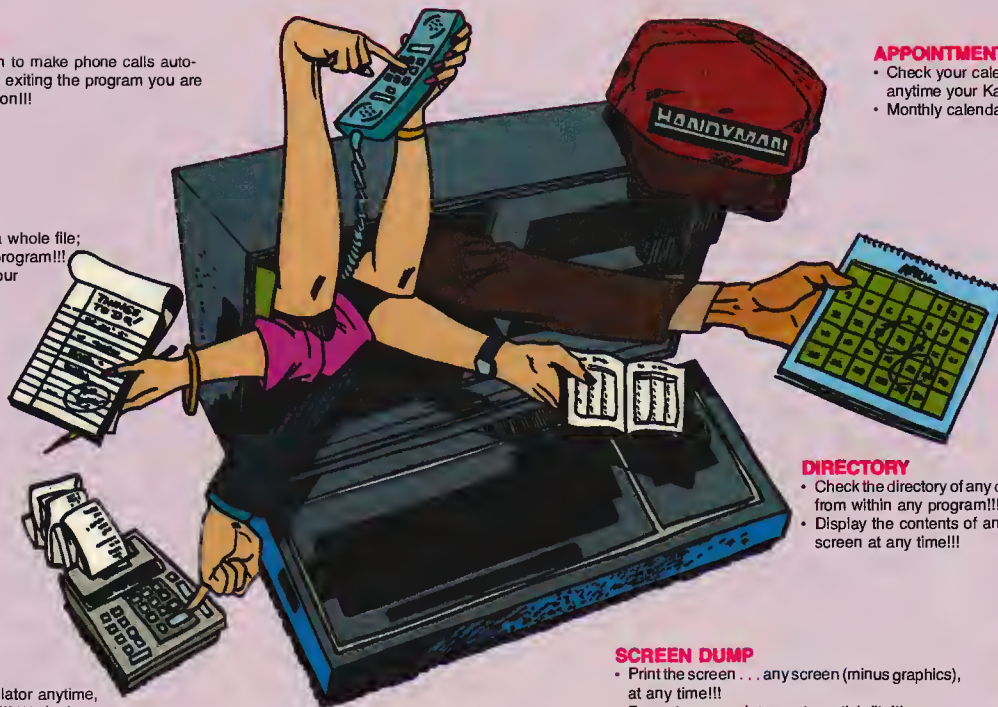
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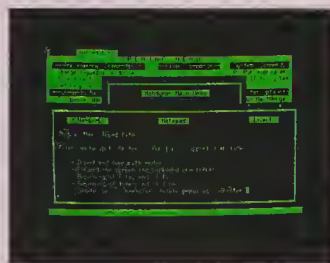
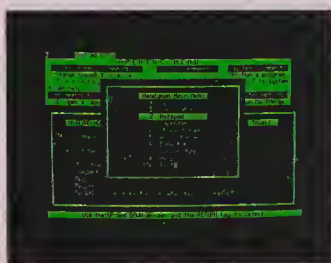
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Books in Brief

by Dick Lutz

In the olden days of microcomputing (pre-1979), each computer arrived with a Guru attached or available at the drop of a floppy disk. These Gurus were black belts in CP/M, with mystic powers over status ports, the I/O byte, system calls, and—if you were lucky—57 varieties of RS-232.

Even more awe-inspiring, they could open the hallowed book-that-was-not-a-book, the Documentation, and, reading in the Prescribed Manner (lips moving, softly murmuring), could find the elusive Magic Tokens required to Rewrite your BIOS.

Gurus always explained things in a language skewed at least 37 degrees from any known form of human speech and responded to requests for clarification with a sigh that suggested the asker was being Deliberately Dense. You dared not take offense at this attitude, for the Guru was perpetually on overtime, always had More Pressing Things To Do, and could—if not treated with Due Deference—leave your system in a mortally impaired condition called Down.

Kaypro (and some others) changed all that, delivering an already-integrated computer with a vanilla CP/M and a few installation utilities that automatically modify the BIOS (Basic Input/Output System, the part of CP/M that adapts it to a particular hardware environment) and with bundled software already modified for the machine's video display. The Guru was, for the most part, shuffled off to standby status.

Yet, the dark art of CP/M modification remains with us, lurking in the amorphous category of The Unknowable—things we'd like to know if only a Guru would give us the straight poop without all the sighing and obfuscation.

Be of good cheer. Our time has

finally come.

CP/M and the Personal Computer Tom Dwyer and Margot Critchfield Addison Wesley, \$19.95

Even when the occasional Guru has, in the past, betrayed the secrets of the order, it's usually written in that same bitspeak that only other Gurus understand, and has stopped a clarifying sentence short of revealing the soul of truth about CP/M with sentences like "Adapting your CP/M to a different printer requires a rewriting of BIOS and is beyond the scope of this work. Seek the assistance of someone conversant with the customs of North American digital idolatry."

Such cop-outs fall neatly into the "users are Deliberately Dense" school of microthought—a school well-known to, but not attended by, Tom Dwyer and Margot Critchfield. Their *CP/M and the Personal Computer* is a masterpiece of demystification. In some 400-plus pages (with over 40 pages of appendices), the book leads the unwashed from

discover knowledge.

A fourth chapter deals with software's Big Four: Word processing, accounting, database management, and spreadsheets. Well-illustrated real-life examples, like a nine-page, blow-by-blow description of a WordStar session, contribute greatly to clarity (and to the size) of the book. Not every user will require all this information, but it's comforting to know it's there when you need to know more.

Chapter 5 deals with two languages, BASIC and C. Wisely, neither treatment intends to supplant manuals or more detailed texts, but each provides enough practical knowledge and experience through the Labs to let you know whether you want more.

Chapter 6, which is 132 pages long, bites the bullet of assembly language programming and modifying CP/M. Its nine sections could legitimately have been published as a separate text. They deal with machine language, ASM, machine language calls from BASIC, CP/M

*Gurus usually write
in the same bitspeak
that only other
Gurus understand.*

ignorance to Competence. Three blessedly clear chapters deal with basic use of a CP/M-equipped computer and its utilities.

Exercises (called Labs) avoid insulting the intelligence of even the knowledgeable user and carry the Dwyer-Critchfield earmark that was so well established in their earlier *BASIC and the Personal Computer*: they've been tried out, and they actually work; not only that, they teach in the most satisfying way—by letting the reader

file structures, modifying programs with DDT, modifying the BIOS, and adding customized device drivers (such as printer drivers) to the BIOS. There are frequent Labs that guide the reader through the Valley of the Shadow of Impossibility, some problems and projects, and a discussion of other operating systems that provides a mini-hook to UNIX and PC-DOS.

The Dwyer-Critchfield book actually makes a good reference work as well as a text, so well-con-

ceived is its plan of organization. If the contents are the sort of thing that points in the direction of your curiosity, it's a certifiable best buy.

Soul of CP/M

**Mitchell Waite and Robert Lafore
Howard W. Sams & Co., \$18.95**

Despite the occasional minor factual boo-boo (like attributing the Z80 chip to Intel), Waite and Lafore have produced an excellent follow-up to Dwyer-Critchfield's Chapter 6. It's probably the life preserver of choice if you want to wade deep and swim far.

None of this is for the faint of heart, but the authors make the pills slide down a tiny swallow at a time. They rightly suggest that the book is intended for the BASIC (or other high-level language) programmer, and suggest earlier works in the series (*CP/M Primer* by Waite and Murtha or *CP/M Bible* by Waite & Angermeyer) if you're starting from scratch.

The premise is to take the reader from an explanation of CP/M's organization through system calls and disk control, through calls from BASIC, to modification for different peripherals. The structure allows the casual reader to skip explanatory sections until the going gets rough, and an abundance of well-commented assembly language programs contributes nicely to practical usefulness and thorough understanding.

CP/M Programmer's Encyclopedia Bruce Brigham Que, \$19.95

The good idea behind this book is to provide a reference to commands in several languages and software packages available for CP/M. The key word here is "reference." This shouldn't be taken as an instructional work that will bail you out when you don't understand some-

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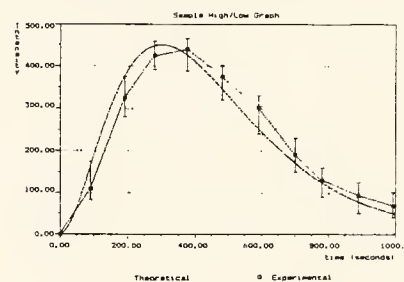
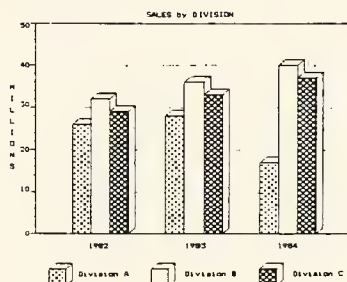
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Learning to operate a computer isn't easy—everyone needs help at one time or another. This precisely the reason users' groups were born.

Basically, a users' group is a collection of computer owners and users who learn from each other. These are non-profit membership organizations devoted to making life with a computer easier.

Need advice on how to set up dBASE II to run your inventory program? Ask around—no doubt your group has a resident dBASE expert just waiting to be consulted. People helping people, that's what users' groups are all about.

Kaypro Users' Groups (KUGs) exist in every state, in Canada, and in countries all over the world. There are two groups in France, one in Belgium, one in Germany, plus others in Finland, Switzerland, Saudi Arabia, and Australia.

All KUGs officially recognized by Kaypro Corporation are re-

corded in a database. These groups receive periodic informational mailings and have access to KUG support programs offered by the corporation. This may include speakers, training aids, special accessory offers, and gifts of promotional items from Kaypro or other companies.

Official KUGs will also receive *ONKUG* The Official National Kaypro Users' Group newsletter, published by Kaypro Corporation.

Finding your KUG

To find the KUG closest to you, write to the KUG Manager at Kaypro Corporation and include your home address, state, and zip code. He will send you a list of the KUGs in your immediate area.

To register a KUG with Kaypro Corporation (and be entitled to corporate support offers), you again should notify the KUG Manager.

The KUG Manager can be reached by writing to:

Jim Durkin, KUG Manager
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Books in Brief

thing. It goes only far enough to be a decent substitute on a shelf that otherwise would sag with barely-used manuals.

For example, CP/M's editor ED is covered in just one and a half sparse pages, and the lack of clarity in the explanations of some commands is worse than in the original CP/M manuals. To illustrate, here's its complete story on the J command: "nJ Juxtaposes n occurrences of the strings."

On the other hand, if you're this deeply into things you're not likely to be using ED, and may need a quick reminder of what various commands do in the following packages: CP/M 3.0, CP/M 2.xx, CBASIC2, PL/1-80, Pascal/MT+, dBASE II, Microsoft BASIC 80, Microsoft BASIC Compiler, FORTRAN-80, and MACRO-80.

This volume can't serve as a replacement or supplement for manuals supplied with the software. It's for the knowledgeable user only, and if you consider it, invest a quarter-hour being sure it thoroughly covers what you need. □



"I told you to stop messing with that Apple!"

Beginner's Luck

by Leslie Gadallah

I knew I was going to have to do it, of course. I had already spent a couple of months listening to various salesmen talk to me in what amounted to a totally foreign language.

But while the salesmen talked, I cleverly kept my son, the computer whiz, near at hand to supply translations as needed. When the salesman said "microprocessor," my son would tell me aside, "The heart of the computer, where arithmetic is done and decisions are made, where most of the actual work goes on," and so I managed to pick my way through claims and counter claims, and settle on the purchase of a Kaypro with a considerable degree of confidence.

This was about two years ago, distant history in the computing world, and Kaypro was hardly a household word back then. Curious friends and neighbors came around to see what I had, and I was just dying to brag a little. But in order to do so, I had to learn the language.

Old words, new meanings

There were sources of confusion. Although some computing terms were self-evident from the start (a file, by association with the manila folders of ancient times, is a unit of stored information), many words I thought I knew took on new meanings. "Hex" is no longer a witches' curse but an abbreviation of "hexadecimal," a way of writing numbers based on the number 16, as decimal numbers are based on the number 10.

(An odd notion, I thought. My son, the whiz kid, says no, because conversion from binary to hex is easier than from binary to decimal. **Binary** *n., adj.*, numbers written in base 2 for the convenience of computers. They're just ones and

zeros to you and me, but they're the only kind of numbers a computer can understand. Hence **bit**, a binary digit; also, the amount of memory required to store a bit.)

Other computer words are brand-new terms. "Modem," from modulator/demodulator, is a word that exists nowhere else in the language. (See glossary below.)

Do-it-yourself dictionary

It became apparent the *Oxford Dictionary of the English Language* was going to be no help here, and the glossary in the back of the CP/M manual sometimes helped, sometimes not. So I started collecting definitions of my own. Some of them were less than rigorous, but perhaps more practical than those purists might devise:

access, *v.*, to gain access to, to be able to use.

alphanumeric, *adj.*, all alphabetic and numeric characters.

ASCII, *adj.*, acronym for the American Standard Code for Information Interchange, the code by which computers recognize characters. Programmers must learn to differentiate between an ASCII character 3, whose code is 51, and the number 3. (Ed. Note: For more detail, see "The Hex/ASCII Connection" on page 82 of the September 1985 issue.)

baud, *n.*, a measurement of the speed at which information is transferred between two computer devices (a modem and a computer, for example). Though originally meant as the modulation rate of the transmission signal (see modem), for practical purposes, it is now used interchangeably with "bits per second" (bps).

bootstrap loader, *n.*, from LOADER, a program that can bring other programs off the disk (or

other storage device, if you happen to have one) and put them into memory to be **executed** (put into effect, not shot to death); stems from the traditional, physically impossible, concept of pulling oneself up by one's own bootstraps. Hence a bootstrap loader must load itself first of all. Also, the "boot" in "warm boot." **To boot**, *v.*, to employ the bootstrap loader when first starting the computer (cold boot) or when starting afresh with the machine running (warm boot).

buffer, *n.*, a place to temporarily store information that's waiting in line to be sent somewhere. Hence, **print buffer**, *n.*, a neat gadget that holds the file I've just sent to the printer, and feeds that file to the printer while leaving my computer free to do something else.

bug, *n.*, an error or fault; **debug**, *v.*, to find and correct bugs. **DDT**, *n.*, bug killer. This "Dynamic Debugging Tool" is a program designed to access command files for purposes of debugging.

CP/M, *n.*, an acronym for Control Program for Microcomputers; an operating system for personal computers; a trademark of Digital Research. Kaypro computers, depending on the model, use either CP/M or MS-DOS (see below).

disk, disc, diskette, floppy, *n.*, all the same thing; a magnetic medium used for permanently storing information. The computing equivalent of a paper document, which can be read as often as desired, but must be written upon with care. Unlike paper, which is written on and merely read, disks are written to and read from. **Hard disk**, a bigger, faster version of a disk with a lot more capacity. **RAM disk**, auxiliary random access memory the computer treats like a disk. Really fast. See RAM.

dump, *v.*, to send everything in

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Beginner's Luck

memory to disk or to the printer. **Screen dump**, to print everything on the screen.

format, *n.*, the predefined pattern in which data are arranged on a disk. *v.*, to prepare a diskette to receive information by using a program (like the Kaypro 10's FLPY-FMT.COM or the "Blank" option of COPY) that magnetically imprints sectors within circular tracks on the disk. (*Ed. Note: For a detailed picture of the tracks and sectors of a formatted disk, see page 60 of the September 1985 PROFILES.*)

firmware, *n.*, the information stored in ROM. See ROM.

hung, *adj.*, busy going nowhere. A system is hung when it's just sitting there spinning its wheels. Often, the only recourse is the reset button.

I/O, *n.*, input and output. Input is what you put into the computer, and output is what comes out.

interface, *n.*, the point at which information can be passed from the computer to something else, or from something else, including you, to the computer. **To interface**, *v.*, to connect something to the computer so that such an exchange can go on; to pass data from one program to another.

K, *n.*, from kilo, a prefix meaning "one thousand"; a K is 1,000 in Standard English, 1024 in computerese. Hence a computer having 64K of RAM has 65,536 bytes of accessible memory.

kludge, *n.*, anything ill-conceived and poorly constructed, particularly if its only marginally effective. **To kludge**, *v.*, to put a device or program together without regard to esthetics or efficiency.

machine code, *n.*, also known as machine language; binary instructions that tell the computer's logic circuits what to do next. Programs written in higher



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level languages, such as BASIC, must first be "translated" into machine language with either a **compiler** or **interpreter** program.

memory, *n.*, integrated circuits containing thousands of electronic switches in which the computer rapidly stores and retrieves information. All data and all instructions the computer is using at any given moment must be in memory so that the microprocessor can get to it in a hurry. The smallest unit of memory is a **bit**, but bits are normally manipulated in groups of eight called **bytes**. Each byte is assigned an address that is used by the CPU when retrieving or storing information. Memory comes in two basic varieties, RAM and ROM.

modem, *n.*, a gadget by which computers communicate with one another over the telephone. The word modem comes from the words "modulator" and "demodulator." A modem, when transmitting, produces a tone that is altered in pitch—modulated—according to instructions from the sending computer. When receiving, the modem converts (demodulates) the tone from another modem into electronic signals the receiving computer can read.

MS-DOS, *n.*, MicroSoft Disk Operating System; an operating system for IBM-compatible microcomputers. (The Kaypro 2, 2X, 4, and 10 use CP/M; the Kaypro 16, 16-2, 286i and 2000 use MS-DOS.)

Nevernever Land, *n.*, the place where important files go at the most inopportune moment and from which I can never, never get them back.

operating system, *n.*, the program that does all the housekeeping chores. Manages memory, handles I/O, loads files on and off disks, schedules events so you're not trying to read the disk and

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Technical Forum

by Tom Enright

This month's Technical Forum begins a discussion of the MS-DOS environment from the operator's point of view. Our first subject will be MS-DOS's named directory structure. This installment is only meant as an introduction to the MS-DOS environment; we'll get into more detail, and other related areas, in future columns.

File segregation

Imagine typing DIR, or D, and having more than 1,000 filenames scroll by on the screen. It would be a little difficult to find one particular file out of that list. The tremendous storage capacity of a hard disk makes this scenario a very real possibility. What's needed is a method of segregating files into logical groups.

With floppy disks you segregate files by putting them on separate diskettes. But on a hard disk you need another method—one that lets you keep word processing files separate from spreadsheets and keeps both of them from getting mixed with your favorite games.

CP/M user areas

CP/M 2.2 employs user areas to keep files on the same disk separate from one another. Under CP/M, every disk has 16 user areas, 0 through 15, available for use. Except under special circumstances, each user area is completely isolated from every other user area, since most software acts as if whatever user area it's in is the only one. That way you can put utility programs in user area 0 (often referred to simply as "User 0"), word processing programs in User 1, BASIC programs in User 2 and so on.

A CP/M user area isn't located on any specific part of the disk. The

first byte of each directory entry on a disk indicates the user area that file belongs to. This way the space available to each user area is equal to the amount of available storage space remaining on the disk.

Kaypro has gone standard CP/M one better by making User 0 public to the rest of the disk. What this means is that you can run programs that are in user area 0 from *any* other user area on that disk. That way you can put one copy of your utility programs in user area 0 and still use them from anywhere else. This applies to User 0 only; all other user areas are completely isolated from one another.

Moving from one user area to another is as simple as typing **User X**, where X is the user area you

approach to separating files. Both operating systems, collectively referred to as DOS, now utilize named directories—labeled listings of related files—to separate files into logical groupings.

While CP/M always gives you exactly 16 user areas, DOS lets you create as many named directories as you need. They can be created in any order and to any extent that fits your requirements.

Under DOS, named directories are linked in what is called an "inverted tree" structure. While a tree grows up from the roots to the branches, DOS named directories start with the ROOT directory and branch downward as far as needed. Since they "grow" down from the ROOT, this structure is called an

**MS-DOS and PC-DOS
(2.0 and later) use
named directories
to separate files.**

want to end up in. Changing user areas is normally done from the operating system level, when the A> prompt is on the screen. This is because most programs are not designed to support changing user areas or reading a data file in another user area.

When you open a data file on another disk, CP/M opens that file in the same user area. This means that if you are in User 1 on drive A and open a file on drive B, that file will be in User 1 on drive B. This handy feature goes a long way toward helping you segregate both programs and their data files.

MS-DOS named directories

MS-DOS and PC-DOS, versions 2.0 and later, take a slightly different

inverted tree.

Starting with the ROOT (main) directory, you can create as many branches as you need, at any time. Each branch can also have as many branches, called subdirectories, as are required. This branching can continue to whatever depth you feel is needed. The only limit on the number of named directories is available disk storage.

CP/M keeps track of which file belongs to which user area by looking at the first byte of the filename. Under DOS, each named directory is actually a data file. It's a special kind of data file that contains directory entries for its member files and any subdirectories that branch off it. On a hard disk this means that

(continued on page 74)

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(continued from page 71)

you have room for as many named directories as you want.

Directory commands

Commands for manipulating named directories are **MKDIR**, **CHDIR**, and **RMDIR**. These commands are used for creating new directories, changing from one directory to another one, and for removing a directory.

MKDIR, or alternately just **MD**, is the command for creating a new subdirectory of the current directory. (The "current directory" is whatever directory you're in.) The syntax for the command is **MD DIRECTORYNAME** where "DIRECTORYNAME" is the name you want assigned to the new directory.

CHDIR or **CD** is used to move to a subdirectory of the current directory. The target directory must already have been created with the **MKDIR** command. Other directory-changing operations are possible, but will have to wait until you've learned about "pathnames," below.

RMDIR or **RD** is used to erase a subdirectory. Before DOS will let you erase a directory, all files in the directory to be removed and any subdirectories of that directory must already have been erased.

Pathnames

When you want to move to a subdirectory, one directly below the current directory, a simple **CD \DIRECTORYNAME** is sufficient. But when the target directory isn't directly below the directory you're in, a longer "pathname" is needed. (Keeping with the geographic analogy, the route to a particular directory or file is called a "path.") The same rule applies to the other directory manipulation commands, but the examples used here will all be for moving from one directory to another.

In specifying the "pathname" to where you want to go, you can enter the path from the current directory, if the target is farther down on the same branch, or from the **ROOT**. When the target directory is in another branch or is closer to the **ROOT** than your present location, specify the pathname from the **ROOT** directory.

Let's suppose that you've set up your hard disk so that the **ROOT** directory has two branches, **UTILITY** and **BASIC**. Also suppose that **BASIC** has one subdirectory called **GAMES**.

Now, assume that you're in the **UTILITY** directory and want to go to the **GAMES** directory. Since **GAMES** is a branch of **BASIC** and you are in **UTILITY** (on a totally different branch), the command would be **CD \BASIC\GAMES** and then press **RETURN**.

DOS also supports two shorthand notations for directory changes. The first one is for going up one level, while the other one goes directly to the **ROOT**. The command **CD ..** will take you up one level to the parent directory of the current directory. The command **CD ** takes you directly to the **ROOT** directory, no matter what directory you're in at the time.

When you're using a program that doesn't support pathnames—many do not—and need to access a data file, the data file will have to be in the same directory as the program you're running or in the **ROOT** directory of another disk.

This isn't quite as convenient as CP/M's characteristic of speaking to the same user area on the other disk. But since DOS's directories aren't static the way that CP/M user areas are, DOS can't afford to make assumptions about the directory structure on another disk. □

(continued from page 70)

software, n., a program or collection of programs, as opposed to **hardware**, the parts (e.g., keyboard, disk drive, wiring) of the computing system I can actually put my hands on (whether or not this is advisable).

source, source file, source code, n., a program in its original language, not translated into machine code.

system, n., everything. The computer and all that's attached to or associated with it. The whole collection of machines, operations, procedures and people you need to get your work done.

system clock, n., a device inside the computer that sends out electronic pulses at regular intervals to keep the internal operations of the machine in step with one another, working in the right order. Everything that happens inside the computer is timed by one or several of these pulses. Don't ask what time is it on the system clock. It keeps time like a metronome, or the timing chain on a car. If I want to know what time it is, I need a real-time clock. (**Real time**—Mountain Standard.)

utility, n., nothing to do with the light and power company. It is, to us computing types, a handy little program for looking after some of the routine jobs such as copying disks, reading directories (the list of files on a disk), erasing or renaming files, or even, bless its heart, unerasing a file.

vanilla, adj., plain, simple, ordinary, without flashy features. □

Leslie Gadallah is a freelance science writer living on a small farm in the Great White North, eh, surrounded by cats, horses, rabbits and chickens.

New Products

by Susan Hyman

The following new product listings are not reviews and should not be considered endorsements of tested products. We may have looked at some of the products, but we do not necessarily have hands-on experience with them.

To be considered for publication in *New Products*, all press and product releases should be sent to: New Products Editor, c/o *PROFILES Magazine*, Kaypro Corporation, P.O. Box N, Del Mar, CA 92014. Releases must state the product's price and on which Kaypro models the product runs. Include black-and-white photos if available.

PROFILES index

A *PROFILES* version of SUBJEX, a database of computer magazines on disk, is now available. SUBJEX displays all references by topic or author. Topics include database, WordStar, S-Basic and the like.

The program lists article name, author, magazine issue, page number, and a short article summary. In addition, users can print portions of the database for specific reference. The index contains up to the current issue.

The program regularly sells for \$14.95, but costs only \$9.95 for a limited time (plus \$2.00 for shipping and handling). Updates are available by returning the master disk with \$6.95.

HORNBY Inc., 13901 Harbour Place, Prospect, KY 40059 (502) 228-1353.

dBASE III compiler

This new program compiles applications written in the dBASE III programming language into modules that execute without the presence of dBASE III.

The program, dBIII Compiler, enables programmers to generate

stand-alone applications programs. Businesses with many computers can use this program to legally reproduce dBASE III applications programs, reducing the need to buy new software for each computer.



dBIII Compiled code can run under MS-DOS and PC-DOS, and can use both dBASE II and dBASE III data files. Besides running independently, these compiled programs run faster and require less storage space. Cross-environment linkers let programmers use one version of the compiler to produce code for different operating systems, such as a PC-DOS user writing code to run in MS-DOS.

\$750 for compiler, \$100 for cross-environment linkers. Kaypro 16, 286i and 2000.

WordTech Systems Inc., Box 1747, Orinda, CA 94563 (415) 254-0900.

Modem interface

Signalman Error-Free is an accessory aimed at the asynchronous



segment of computer-to-computer or computer-to-terminal communications. The device is placed

between the modem and computer (or dumb terminal) at both the sending and receiving stations to assure error-free transmission and reception.

The unit, about the size of a modem, does not interfere with the software being used.

\$199. Anchor Automation Inc., 6913 Valjean Avenue, Van Nuys, CA 91406 (818) 997-7758.

Pascal tools

TurboPower is an integrated set of software tools that supplements microcomputer program development using Borland International's Turbo Pascal 2.0.

TurboPower allows programmers to find differences and look for patterns in files. It also erases, renames and prints files. If a change in a program being developed causes it to break, TurboPower will tell the user what has changed.

\$24.95. Kaypro 2, 4 and 10. Pascal Power, 5666 La Jolla Boulevard, Suite 136, La Jolla, CA 92037.

Self-help package

The Perfect Software/Word Plus Self-Help Package contains 14 flip charts with commands for the old version of Perfect Writer, Speller, Calc and Filer, and The Word Plus. These reference aids use the form notative technique.

Included in the package are disk tutorials, a two-year index to Kaypro-specific publications, Perfect Writer reference files, and more.

\$12.95. Kaypro 2, 4 and 10. Rememberbooks, P.O. Box 2501, Virginia Beach, VA 23450.

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New Products

can find help in *Nonprofits Enter the Computer Age*, a new publication on how computers work, what they do and don't do well, and how nonprofits can make the best of them.

The 35-page booklet is based on experiences of community groups owning computers.

\$6.95. Community Careers Resource Center, 1520 16th Street N.W., Washington, D.C. 20036 (202) 387-7702.

Epson FX printer upgrade

Epson FX printer users can have near-letter-quality (NLQ) print using the Finger Print "LetterWriter" upgrade kit. The NLQ mode has four times the resolution of standard dot-matrix printing.

Finger Printer "LetterWriter" is a kit of replacement ROMs for original and series FX-80 and FX-100



printers. Complete operating and installation instructions are included with the kit.

\$79.95. Dresselhaus Computer Products, 837 East Alosta Avenue, Glendora, CA 91740 (818) 914-5831.

Printer buffer program

SpoolBuffer stores to disk all output bound for the printer and later sends it to the printer at a slower

speed. This process reduces the time a user spends waiting for the printer to finish before starting work again.

The buffer is started with a single keyboard command. A function to skip printing specific pages is included. With a copy of this program for several computers, printers can be shared. Disk space can be reused once the contents are printed.

\$29.95. Kaypro 2, 4 and 10. Interactive Software Research Inc., 7940 Air Park Drive, Gaithersburg, MD 20879 (301) 840-0417.

Bulletin board's new number

The Online Computer Telephone Directory BBS Information Exchange (OLCTD-BIE) is now available 24 hours per day at (816) 436-4563. It contains a variety of helpful databases for beginning and experienced users, including a list of over 700 free-access bulletin board systems located throughout the U.S. and Canada.

For more information, contact Jim Cambron, 6810 North Liberty Street, Kansas City, MO 64118 (816) 468-4470.

Kaypro raincoat

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\$12. Ideaco, 3230 357 SE, Fall City, WA 98024 (206) 222-7836.

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\$49 each. Kaypro 16 and 2000. SourceView Software International, 835 Castro Street, Martinez, CA 94553 (415) 228-6220. □

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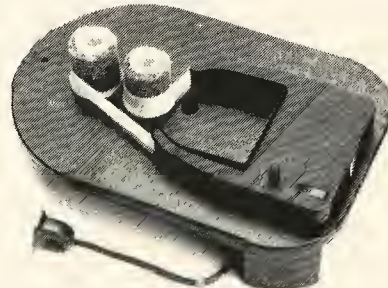
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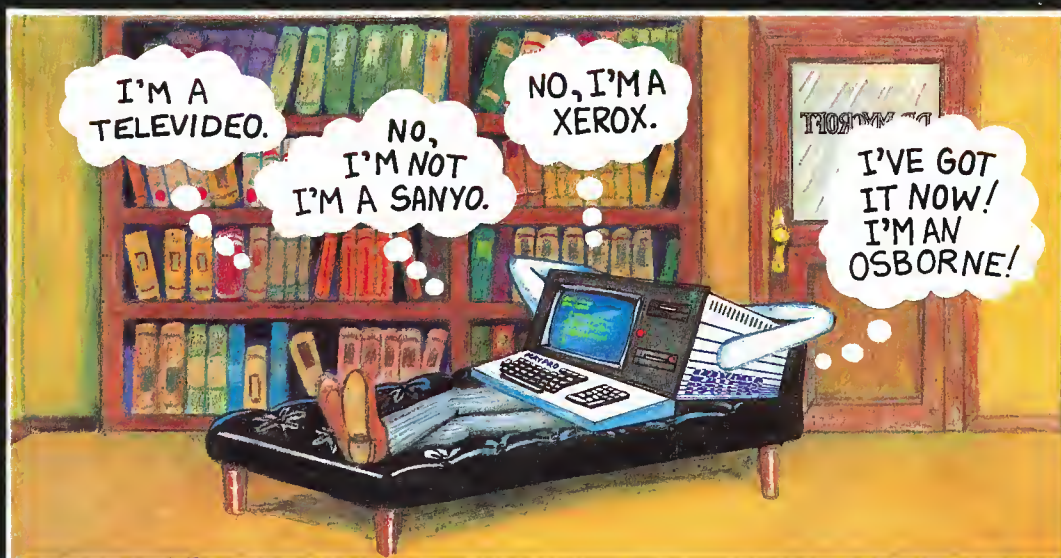
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